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Youden Gets Wilks Award At 15th Annual Conference On Design of Experiments

Activities at the 15th annual Conference on the Design of Experiments in Army Research, Development and Testing, Oct. 22–24, climaxed with presentation of the American Statistical Association's Samuel S. Wilks Award to Dr. W. J. Youden.

More than 140 of the nation's leading military, academic and industrial mathematicians and statisticians, assembled at HQ U.S. Army Missile Command, Redstone (Ala.) Arsenal, hailed the selection of Dr. Youden, now retired from the National Bureau of Standards. The citation states:

"To Dr. W. J. Youden, father of 'Youden Squares' and the 'Youden Diagram,' for his extensive contributions to the art and practice of experimentation in the sciences and engi-

(*Continued on page 3*)

Featured in This Issue...

Quad Cities' 12-Year Effort Produces Graduate Study Center ... p. 10

Deseret TC Gains Diagnostic Tool to Identify Disease Carriers ... p. 13

AUSA Meeting Stresses Forces of Change Reshaping U.S. Army ... p. 14

Secretary Laird Details Technological Superiority Complexities ... p. 24

CRD Discusses Aircraft Requirements at Army-Industry Meet ... p. 26

AMMRC Investigates Composite Materials for Army Applications ... p. 40

ARIEM Aims at Protection of Soldier for Maximum Effectiveness ... p. 42

Senate Confirms Johnson as ASA (R&D)

Robert L. Johnson

President Nixon's appointment of Robert Louis Johnson, industrial missiles and space executive, as Assistant Secretary of the Army (Research and Development), was confirmed Nov. 3 by the United States Senate.

Dr. Russell D. O'Neal resigned as ASA (R&D) in December 1968, after serving since October 1966, to become vice president of Bendix Corp. Selection of Mr. Johnson follows a 10-year pattern of appointing a nationally known industrial executive to this position.

Charles L. Poor, acting ASA (R&D) during the interim, will return to his responsibilities as Deputy ASA (R&D), a position he has filled since June 1963. He has distinguished himself as an Army scientist since 1946, receiving many awards.

Graduated from the University of California at Berkeley (BS and MS degrees in mechanical engineering, 1941-42), Mr. Johnson is qualified for his ASA (R&D) responsibilities by 23

(*Continued on page 3*)

Norton Leaves AVSCOM For MASSTER Key Role

Maj Gen John Norton, CG of the Army Aviation Systems Command for two years, recently became deputy project director for the Master Army Sensor Systems Test, Evaluation and Review (MASSTER) organization.

Activation of Project MASSTER at Fort Hood, Tex., is one of several reorganizations approved recently by the Chief of Staff and the Secretary of the Army to provide a dedicated

(*Continued on page 5*)

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8 Nations Renew Satellite Communications Pact

(*See story on page 4*)

MEMO OF UNDERSTANDING for 8-nations communications pact is signed by Brig Gen Kenneth F. Dawalt, Deputy Chief of R&D for International Programs, OCRD. In background (from left) are Dr. William B. Littler, United Kingdom; Maj Dirk W. F. Kramer, Netherlands; Lt Gen Florent V. P. Van Rolleghem, Belgium; Col Ludovico Luppis, Italy; Brig Gen Ernest D. Danby, Canada; Commodore Charles O. Herlofson, Norway; Col Erich Rother, Germany.

Top Food Leaders Discuss Food for the Military Man

Improvements in techniques and foreseeable objectives of keeping soldiers happier with respect to food requirements were discussed by military, academic and industrial leaders Oct. 20–22 at the Symposium on Feeding the Military Man.

More than 400 participants contributed to the exchange of information and ideas at the 3-day meeting at the Army Natick (Mass.) Laboratories. NLABS Scientific Director Dr. Dale H. Sieling was chairman.

"Toward a National Nutrition Policy" was the subject of Dr. Jean Mayer, special consultant to President Nixon, as the banquet speaker. Dr. Kenneth T. Farrell, technical director, Product Development Department, United Fruit Co., was toastmaster.

Joint sponsors of the sessions with NLABS were the Research and Development Associates for Military Food and Packaging Systems, Inc., and the Advisory Board on Military

(*Continued on page 4*)

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Army R&D Newsmagazine

Vol. 10 No. 9 • November 1969

Editor . . . . . Clarence T. Smith
Associate Editor . . . . George J. Makuta

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Purpose: To improve informal communication among all segments of the Army scientific community and other Government R&D agencies; to further understanding of Army R&D progress, problem areas and program planning; to stimulate more closely integrated and coordinated effort among Army R&D activities; to express views of leaders, as pertinent to their responsibilities, and to keep personnel informed on matters germane to their welfare and pride of service.

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Chesarek Discusses R&D Problems Tied to Cutbacks

Problems confronting research and development managers due to funding cutbacks and public criticism at a time when the effort to maintain technological superiority over any potential enemy is increasingly critical were discussed recently by General F. J. Chesarek.

Speaking to the Rotary Club of Chicago, the commanding general of the U.S. Army Materiel Command stated:

* * *

Rotarians are definitely a viable force in this country and have proved extremely helpful to the Armed Forces in times of national stress.

Today we are again facing a national crisis, and one in which you can render valuable assistance. This crisis is different in that the attack is internal, aimed at the credibility and capability of defense officials to manage their affairs.

General Ferdinand J. Chesarek

The challengers have a wide array of purpose. There are those who are seeking to change our foreign policy and international commitments by attacking the defense apparatus that supports existing foreign policy.

This group applies what can be described as the Rubber Russian Concept in support of its position. In applying this concept, one stretches or compresses the threat analysis, usually by focusing on enemy intentions rather than on capabilities.

In this instance, the dangers posed by world instability are played down, indicating that the continuation of strong defense forces is unnecessary. At the same time, these groups say that we in the defense establishment apply the concept in reverse where, by appropriate stretching, we indicate that our current capability is insufficient for the threat posed.

Another group seeks to change our national priorities by reducing arbitrarily the resources allotted for defense and applying these resources to a wide assortment of domestic needs. This group seeks to apply the principle of well-balanced inadequacy, best described by the old maxim: "A chain is only as strong as its weakest link." Any analyst well-tuned to the principle of well-balanced inadequacy would recognize that the solution is to weaken all other links, thereby bringing all parts of the chain into inadequate balance.

Still another group of critics are those who are knowledgeable of the profession of management and of our affairs and who seek the soft spots in our large defense budget. This is legitimate criticism. Certainly we can do a better job, and we are constantly striving to do so. I know of no industry, governing body, or any other institution that has reached an unchallenged summit of managerial excellence.

In the pandemonium of day-to-day coverage of defense affairs, and with the wide diversity of purpose of our critics, it is not possible to obtain a balanced appraisal of defense policies and programs, nor of the efficiency of their implementation. Yet, without such a balanced appraisal, grievous harm to the country can result. Let me cite an example.

In research and development, budgetary reductions will force a scaleback of new systems development. It is important that the public realize the long term impact of this course. Dr. John Foster, the Director of Defense Research and Engineering, addressed this matter at a recent Defense Management Symposium. The nub of his concern is well worth repeating, and I quote from his remarks:

"Research and development funds may well be reduced and then confined for the foreseeable future to some lower level. This trend faces us just as the Soviet Union has pulled roughly even with the United States in the amount of effort put into defense-related research and development.

"Furthermore, the Soviet Union is increasing its efforts at a disturbing rate. Therefore, the United States in the future may well see superiority in defense technology pass to the Soviet Union. Let me explain how this can work.

"We rely on weapons of all kinds to deter war or to fight one if deterrence should fail. The quality and numbers of those weapons, in relation to the countering weapons in another country, directly effect our ability to deter and fight. The qual-

(*Continued on page 28*)

Youden Gets Award at Design of Experiments Meet

(*Continued from page 1*)

neering, through conception and lucid exposition of novel, yet rather elementary, techniques of statistical analysis and crafty application of standard methods. . . . "

The citation also acclaims his "exceptional productivity as an author, indefatigable energy and phenomenal effectiveness as a speaker, by which he has inspired a whole generation of scientists and engineers to greater achievements through application of his unique statistical precepts."

Sponsored by the Army Mathematics Steering Committee on behalf of the Office of the Chief of Research and Development, HQ DA, the conference is programed to foster the use of statistical methodology in Army programs. Brig Gen George H. McBride, acting CG, U.S. Army Missile Command, welcomed conferees as host to the meeting.

Major technical presentations centered on the theme of "Techniques for Evaluating Performance of Complex Systems." Dr. Oscar Morganstern, chief of the board of Mathematics and professor of political economy at Princeton University, was the banquet speaker.

Dr. Frank E. Grubbs, chief operations research analyst, Aberdeen (Md.) R&D Center, and the first recipient of the Wilks Award, was conference chairman.

Major technical papers were presented by Dr. John E. Condon, director, Reliability and Quality Assurance, National Aeronautics and Space Administration, on "Reliability Applied to Space Science;" Dr. Nancy R. Mann, Rocketdyne Corps; and Dr. Clifford J. Maloney, U.S. Department of Health, Education and Welfare, "Probability Approach to Catastrophic Threat;" Richard G. Krutchkoff, Virginia Polytechnic Institute, "The Empirical Bayes Approach to Design and Analysis;" Dr. S. C. Saunders, Boeing Co., "Confidence Limits for Performance of a System When Few Failures are Encountered."

The conference was organized into seminars of specialty interest for general discussion of problems and advances in state-of-the-art.

Previous recipients of the Samuel S. Wilks Memorial Medal, which includes a variable cash award, donated by Philip G. Rust of Thomasville, Ga., include John W. Tukey, Princeton University, 1965; Maj Gen Leslie E. Simon (USA, Ret.), 1966; William G. Cochran, Harvard University, 1967; and Jerzy Neyman, University of California, 1968.

President A. Ross Eckler of the American Statistical Association approved the 1969 award to Dr. Youden, selected by a committee consisting of Prof. Robert E. Bechhofer, Cornell U.; Prof. William G. Cohran; Dr. Francis G. Dressel, Duke U. and Army Research Office-Durham (N.C.); Dr. Churchill Eisenhart, National Bureau of Standards; and Prof. Oscar Kempthorne, Iowa State U.; Dr. Alexander M. Mood, U. of California; Maj Gen Simon; Dr. Tukey and Dr. Grubbs.

DR. YOUDEN was born in Townsville, Australia, in 1900 and two years later the family returned to Dover, England, for a 5-year stay before moving to the United States. Graduated from the University of Rochester in 1921 with a BS degree in chemical engineering, he received MS and PhD degrees in the same field from Columbia University (1923–24).

Dr. W. J. Youden

Dr. Youden then joined the staff of Boyce Thompson Institute for Plant Research in Yonkers, N.Y., as a physical chemist. With the exception of a 3-year Army Air Force assignment as an operations analyst, he remained at the Institute until he joined the National Bureau of Standards staff in 1948 as assistant chief, Statistical Engineering Laboratory, then in its second year of existence.

His growing interest in statistical aspects of experimentation was first notably evidenced in a paper titled "A Nomograph for Use in Connection with Gutzeit Arsenic Determinations on Apples." This was published in 1931, Vol. 3, No. 3 of the Contributions from the Boyce Thompson Institute.

U.S. Senate Confirms Johnson as ASA (R&D)

(*Continued from page 1*)

years experience as an industrial design engineer and executive. He served in the Navy, 1942-46.

Douglas Aircraft Co. promoted him in 1955 to assistant chief missiles engineer, following nine years in the organization as an engineer on missile design, guidance and control projects. In 1958 he moved up to chief engineer, Missiles and Space Systems.

Three years later, in August, he was elevated to director, Research and Engineering, and after two months stepped up to vice president, Missiles and Space Systems Division. In January 1965, he was appointed vice president in charge of the Manned Orbiting Laboratory Program and served in this capacity until President Nixon selected him as ASA (R&D).

Honored in 1960 as the recipient of the American Rocket Society's James H. Wyld Memorial Award, for outstanding application of rocket power in the Thor missile, he is credited with major contributions to the Nike Ajax, Nike Hercules, Nike Zeus, Skybolt, Genie, and Honest John missiles as well as to the Thor Delta and Saturn space vehicles.

Mr. Johnson is a resident of Newport Beach, Calif., and a member of the Engineering Advisory Council, University of California. He is a member of the American Society for Engineering Education, the California State Technical Services Program Advisory Committee, and an Associate Fellow, American Institute of Aeronautics and Astronautics.

20 Canadian Leaders Exchange R&D Reports at U.S. Meetings

More than 20 top Canadian Defence Ministry scientists and engineers recently held their third annual meeting at Forth Monmouth, N.J., to exchange information with U.S. counterparts on military communications and electronics.

Members of the Canadian Defence Research Board were welcomed by Maj Gen Walter E. Lotz Jr., CG of the Army Electronics Command and Fort Monmouth. ECOM Deputy for Science and Chief Scientist Dr. Hans K. Ziegler was host for briefings on active projects in the Communications-Automatic Data Processing; Electronic Components, Avionics, Combat Surveillance, Target Acquisition and Systems Integration; and Electronic Warfare laboratories and the Institute of Exploratory Research.

Following two days at Fort Monmouth, the Research Board moved to Fort Belvoir for further briefings on the program of ECOM's Night-Vision Laboratory.

KEY PARTICIPANTS in "Feeding the Military Man" symposium at Natick (Mass.) Labs (NLABS) included (from left) Dr. Dale H. Sieling, NLABS scientific director; Dr. Kenneth T. Farrell, technical director, Product Development Department, United Fruit Co.; Dr. Jean Mayer, special consultant to the President on food, nutrition and health; Brig Gen Felix J. Gerace, NLABS CG.

Top Food Leaders Discuss Feeding the Military Man

(Continued from page 1)

Personnel Supplies, National Academy of Sciences, National Research Council.

Speakers representing each of the military services reported on activities to improve the quality of food service to their personnel, as follows: *Army*, Lt Gen Austin W. Betts, Chief of Research and Development; *Air Force*, Brig Gen A. A. Riemondy, director, Supply and Services; *Navy*, Rear Adm B. H. Bieri Jr., Naval Supply Systems Command; *Marine Corps*, Maj Gen Wallace H. Robinson Jr. Quartermaster General.

Prof. Erik von Sydow, director, Swedish Institute for Food Preservation Research, gave one of the feature addresses on "What is Lacking in Food Research Today." Another luncheon speaker was Lt Col J. P. Crowdy, Ministry of Defence, Army Personnel Research Establishment, England, on "Hunger Patrol."

Sessions were organized on the topics of The Military Perspective; Food Service and Convenience Foods; Storage and Delivery; Sustaining the Individual; and Quality Evaluation.

Chairmen, in addition to Dr. Sieling, were Dr. Carl H. Krieger, president, Campbell Institute for Food Research; Col William B. Levin, military coordinator for the Department of Defense Food Program, NLABS; Col James P. Littlejohn (Ret.) manager, Food Specifications, Kellogg Co.; and Dr. Roy E. Morse, professor, Department of Food Science, Rutgers University.

Speakers and their topics included: Col Katherine E. Manchester, chief, Food Service Division, Walter Reed General Hospital, "The Role of Equipment"; Ross C. Reed, director, Packaging Research, Kraftco Corp., "The Role of Packaging"; Theodore J. Pethes, IBM Corp., "The Role of the Computer"; and

Dr. Clinton O. Chichester, professor and head, Department of Food Science, University of California at Davis, "Minimizing Deterioration of Processed Foods"; F. Warren Tauber, manager, Food & Packaging Development, Union Carbide Corp., "The Contribution of Packaging"; Dr. John M. Harvey, Market Quality Division, U.S. Department of Agriculture, Fresno, Calif., "Delivery of Fresh Fruits and Vegetables"; and

Dr. Maxwell C. Brockman, Food Laboratory, Natick Laboratories, "Minimizing Weight and Bulk"; Dr. Walter M. Urbain, professor, Department of Food Science, Michigan State University, "Radiation Update"; Dr. David R. Peryam, technical director, Peryam and Kroll Research Corp., "Food Preferences and Attitudes";

Dr. Joseph E. Bradley, director, Market Research, Thomas J. Lipton Co., Inc., "Altering Consumer Attitudes"; Dr. Kaare Rodahl, professor, Institute of Work Phsyiology, Oslo, Norway, "Food Intake and Performance"; Dr. Josef Prozek, research professor, Department of Psychology, Lehigh University, "Nutrition and Behavior";

Dr. Betty C. Hobbs, director, Food Hygiene Laboratory, Central Public Health Laboratory, London, England, "The Microbiological Safety and Quality of Foodstuffs"; Richard S. Hunter, president, Hunter Associates Laboratory, Inc., "Methods of Evaluation and Standards for the Appearance Quality of Foods"; Dr. Birgir K. Drake, Swedish Institute for Food Preservation, "Evaluation of Texture"; and Dr. Edgar A. Day, vice president, R&D, International Flavors and Fragrances, Inc., "Flavor and Aroma."

8 Nations Renew Satellite Communications Pact

Extension of the North Atlantic Treaty Organization research and development program in tactical satellite communications involving eight nations was announced recently, when representatives signed a Memorandum of Understanding continuing a November 1967 agreement.

The action was taken in the Pentagon office of Brig Gen Kenneth F. Dawalt, Deputy Chief of Research and Development (International Programs), HQ DA. Signatories are Belgium, Canada, Federal Republic of Germany, Italy, The Netherlands, Norway, United Kingdom, and the United States. A representative of Supreme Headquarters Allied Powers Europe (SHAPE) participated.

This latest phase is a cooperative test program using the synchronous Lincoln Experimental Satellite (LES–6), launched from Cape Kennedy in September 1968, and a network of small tactical satellite communications terminals built and operated by the program participants.

The initial NATO TACSATCOM Program formalized in 1967 uses the LES–5 with small ground-based, seaborne and airborne terminals, built by each of the participants, plus truck-mounted shelter terminals fabricated in the United States for Belgium, Canada and Italy.

Since the original Memorandum of Understanding, NATO members have been conducting cooperative tests to evaluate the concept of tactical satellite communications as a dependable tool in the NATO environment.

Based on test plans prepared jointly by the NATO group, the many scientific aspects of such communications are being studied to confirm technical and operational feasibility.

Success of LES–5 tests and the mutually beneficial results led to interest in further cooperative experimentation. Complete evaluation, it is hoped, will lead to definition of a system that could be used to satisfy certain tactical communications needs of NATO.

Norton Leaves AVSCOM for Key Role With MASSTER

(*Continued from page 1*)

STANO (Surveillance, Target Acquisition and Night Observation) management structure.

When he reported to Fort Hood in mid-October, General Norton assumed duties as deputy to Lt Gen Beverly E. Powell (CG of Fort Hood), the project director. MASSTER's mission is to perform integrated test and evaluation of STANO items.

Close working relations to achieve this objective are involved with the Army Materiel Command, Combat Developments Command, Continental Army Command, and the Army Security Agency.

The concept of STANO as a total integrated systems approach is to get the most out of the Army's available resources and the tactical advantages of advancing technology in the highly critical field of surveillance, target acquisition and night observation.

STANO will seek to raise this function of field Army intelligence to the level of other major Army functions of land combat such as firepower, mobility, command and control, and communications and service support.

Placing the STANO project at the Chief of Staff level establishes its priority as one of the most important of ongoing R&D activities. Records indicate that the only two other Army projects at this level are the Safeguard ABM System and the Cheyenne Advanced Aerial Fire Support System (AAFSS). R&D are continuing on AAFSS although Cheyenne procurement has been halted.

Brig Gen William B. Fulton, the STANO Systems Manager (STANSM), reports directly to the Army Chief of Staff, General William C. Westmoreland, but receives executive level guidance and direction from the STANO Steering Group. Army Vice Chief of Staff General Bruce Palmer is chairman of the group.

STANO executive agents to facilitate management are provided by the Deputy Chief of Staff for Personnel (DCSPER); Deputy Chief of Staff for Logistics (DCSLOG); Office of the Chief of Research and Development (OCRD); Office of the Assistant Chief of Staff for Intelligence (ACSI); Assistant Chief of Staff for Force Development (ACSFOR); Assistant Chief of Staff for Communications and Electronics (ACSC–E); and the Deputy Chief of Staff for Military Operations (DCSOPS).

Along with representatives of the Army Materiel Command, Continental Army Command, Combat Developments Command, and the Army Security Agency, these agents constitute the STANO Executive Committee, chaired by General Fulton as STANO Systems Manager.

Maj Gen John L. Klingenhagen

Maj Gen John L. Klingenhagen is the new CG of AVSCOM, where he takes on the challenge of meeting the Army's over-all aircraft procurement and maintenance needs. Since January 1967, he has been special assistant for Logistical Support of Army Aircraft to the Deputy Chief of Staff for Logistics, Washington, D. C.

Following 28 months in Vietnam as chief, Logistics and Communications, Army Concept Team, and later as deputy CO, U.S. Army Support Command, General Klingenhagen became CO of the U.S. Army Aviation Materiel Laboratories, Fort Eustis, Va., in 1965.

In 1963 he was a member of the Tactical Mobility Requirements Board (Howze Board) studying logistical operations and support as related to tactical air mobility. After six years on the Army General Staff and in the Office of the Secretary of Defense, he was graduated from the National War College in 1960. He then served three years as deputy for RDT&E, Transportation Materiel Command.

Deputy DDRE Lists Foreseeable Trend Areas

Seven major areas of effort geared to foreseeable trends in research and development activities are listed in "Forecasting Future Military Missions and Their Technological Demands" by Dr. Donald M. MacArthur in the October 1969 *Defense Industry Bulletin.*

The Deputy Director of Defense Research and Engineering (Research and Technology) discusses national policy choices and military missions, including the difficulty of identifying "certain areas for emphasis which seem to possess 'high-leverage' in solving national security problems.

"While there has been a considerable amount of successful work in forecasting and in the development of useful forecasting aids," he states, "it is fair to say that the field is still evolving. We can be more systematic and mathematical than the ancient prophets. Planning, forecasting, or prognasticating may seem formally easier now, but they still seem little better than the insight of those who practice this difficult profession."

Based on the assumption that strategic nuclear deterrence will remain the primary objective, and that supporting military forces will be designed to deter lower-level conflict and to prevent escalation should conflict nevertheless occur, Dr. MacArthur lists these areas for improvement in long-range planning:

- First, and most important, continued emphasis on all of the equipment required for a sufficient and credible strategic nuclear deterrent in the face of what we can expect to be considerable uncertainties about growing Soviet and Chinese capabilities.
- Second, we will need to continue to improve our *all-weather, all-climate* fighting, capability, including our ability to hit targets *much more accurately* than we can today and at a cost commensurate with the *value of the target.* Another revolutionary concept first tested recently in Vietnam is the ability to provide around-the-clock, real-time battlefield surveillance.
- Third, high reliability and greater flexibility so that over-all costs, and particularly logistic and maintenance requirements, can be minimized.
- Fourth, mobile and flexible deployment systems in small units, capable of rapid integration into larger units, sufficient to stop trouble before it breaks into major conflict.
- Fifth, much better understanding of the relationship among the military, political, economic, technical, and psychological factors influencing successful deterrence along both the strategic and tactical dimensions of the use, or the threat of the use, of force.
- Sixth, strategic and tactical intelligence and surveillance data collection and processing systems.
- Seventh, strategic and tactical real-time, comprehensive command-control communications systems that allow detailed handling of dispersed units in crisis situations.

Lt Gen Hal B. Jennings

Brig Gen Spurgeon H. Neel Jr.

Neel Becomes Deputy to Surgeon General Jennings

Army Surgeon General Hal B. Jennings, who assumed that title Oct. 1 when Lt Gen Leonard D. Heaton retired after a 43-year Army career, completed the phenomenal feat of promotion from colonel to 3-star rank in 13 months—without ever wearing two stars.

The jump from brigadier to lieutenant general came within a few weeks and at age 54 he became one of the youngest TSGs in Army history. Maj Gen George E. Armstrong, who served from 1951 to 1955, was the youngest when appointed at age 51.

A biographical sketch of General Jennings, who began active duty in 1942, was carried in the June-July *Army R&D Newsmagazine.*

One of his first official acts after he was sworn in at ceremonies at the Pentagon was to assist in the swearing-in of Brig Gen Spurgeon H. Neel, Jr., as Deputy Surgeon General of the Army.

General Neel is well known to the Washington, D.C. area, having served as assistant chief of the Hospitalization and Operations Division and as chief of the Army Aviation Section, Office of The Surgeon General, from December 1954 to September 1957.

He then attended the Harvard School of Public Health where he received his MPH in 1958. He returned to Washington in 1964 to attend the Industrial College of the Armed Forces and for additional schooling at George Washington University where he received an MBA degree in 1965.

Between tours in Vietnam, General Neel served two years as director of Plans, Supply and Operations in the Surgeon General's Office. Early in his military career he served with troops, commanding a medical section, company, battalion and hospital group. Later he served as a division, post and joint command surgeon.

General Neel is particularly qualified in aviation medicine and has written a number of papers on the subject. He is a Diplomate of the American Board of Preventive Medicine in Aviation Medicine.

General Neel is a Fellow of the American College of Physicians, a Fellow and past vice president of both the American College of Preventive Medicine and the Aerospace Medical Association, and a member of the American Medical Association and the American College of Hospital Administrators.

OTSG Announces Development of Army Heart Monitor

Development of an Army Heart Monitor by the Harry Diamond Laboratories was announced Oct. 14 by the Office of The Surgeon General, HQ Department of the Army.

The electronic device monitors the electrical activity of the heart and sounds an alarm when certain conditions exist, giving rapid warning to permit proper medical measures.

The portable, battery-operated unit is about the size of a breadbox and is designed for use in stateside hospitals or in the field where a compact, rugged device is required.

In addition to alarming when a high or low heart rate or excess electrical noise exists, the monitor indicates when the heart has ceased contracting (cardiac arrest) or is essentially just quivering and not contracting adequately (ventricular fibrillation).

Because the monitor performs its functions automatically, without the need for an observation of the electrocardiogram by trained personnel, the unit may be used in situations where complicated equipment such as oscilloscopes and paper writers are not available or their use is not feasible.

All that is necessary to use the monitor is to attach three electrodes to the patient in any of a variety of locations such as the arms and legs, to plug the wires from the electrodes into the Army monitor, and to turn it on.

Electrical signals generated by the patient's heart are analyzed by the monitor, and indication of the heart condition is made rapidly and automatically.

The basic advantages of the Army monitor over presently existing equipment are recognition of ventricular fibrillation; more patients can be monitored and their chances of survival increased; immunity to high levels of electrical noise and spurious signals; automatic operation with a minimum of user training required; long-term operation on batteries; lightweight, small size capability of being easily carried; and meeting of military environmental standards.

Resor Names Army Medical Specialist Corps Chief

Secretary of the Army Stanley Resor has selected Lt Col June E. Williams as the next chief of the Army Medical Specialist Corps when Col Mary L. Hamrick retires Dec. 31.

Graduated in 1948 in home economics from Syracuse University, Lt Col Williams served her internship at Brooke Army Medical Center, Fort Sam Houston, Tex. She has a master's degree in hospital administration from Baylor University and a PhD in food administration from the University of Wisconsin.

She has served at general hospitals in the United States, Japan and Korea. Her promotion to colonel should follow soon.

Lt Col Williams has been assistant chief of the Army Medical Specialist Corps and chief of the Dietitian Section since July 1, 1966. She is a member of the American Dietetic Association, American Hospital Association, American Home Economics Association, District of Columbia Dietetic Association, and the Association of Military Surgeons.

Lt Col June E. Williams

MERDL Reports Equipment Drops Combat Mortality

Medical equipment developed at the U.S. Army's Medical Equipment Research and Development Laboratory (MERDL) at Fort Totten, N.Y., is credited with contributing greatly to reducing the combat mortality rate in Vietnam as compared to the Korean Conflict.

In Korea, 43 men of each 1,000 exposed to combat lost their lives—more than double the mortality rate in Vietnam.

MERDL scientists, engineers and technicians have developed ruggedly built field anesthesia kits, portable operating tables, battery-powered surgery lamps, X-ray units and film processors, and folding field hospital beds —to list but a few of their medical devices that have permitted Army doctors to work faster and more efficiently in field hospitals close to combat areas.

MERDL researchers have developed several "firsts" that have substantially advanced medical field operations, and they have commercial patent rights on some of these inventions.

One of the notable inventions is the "shot-gun"—technically known as the hypodermic jet injection apparatus—developed by Aaron Ismach, chief, Engineering Division. After two years of prototype testing, the gun was adopted for military use in 1961.

Aaron Ismach holds early model of hypodermic jet injection apparatus he designed at MERDL to speed up immunization procedures for the Army.

The U.S. Public Health Service used the jet injector in 1967 to inoculate 25 million Africans. Sponsored by the United States Agency for International Development, the project involved a 3-year campaign to vaccinate 120 million persons in Africa against smallpox, and 30 million children against measles.

Medical equipment and utensils for field use are only as good as the punishment they can withstand under combat conditions. Consequently, prototype tests are made under the most severe of combat conditions ("torture" proofing) and often for a long and sustained period.

MERDL engineers and draftsmen did the initial feasibility studies for an inflatable field hospital known as a Medical Unit, Self-contained Transportable (MUST). They are now working on several aspects of a field medical laboratory, under the MUST.

MERDL Technical Director Benjamin Pile packs 17-pound portable field surgery lamp into case. Pile developed the battery-powered lamp that can give light eight hours continuously.

MUST Success in Vietnam Prompts Expansion Plan

Successes scored by U.S. Army MUST hospitals in Vietnam, where they have undergone their "baptism by fire" since 1966, have influenced The Surgeon General to call for eventual conversion of all Army field hospitals to the revolutionary units.

MUST denotes Medical Unit, Self-contained, Transportable, but the hospitals frequently are dubbed "rubber Quonsets" by U.S. fighting men. Until the inflatable units were introduced in Vietnam, field hospitals did not differ much from those used during World War II.

Medical officers whose service dates to Word War II remember well the inadequacies of many field hospitals—often dimly lighted tents with dirt floors and little means of overcoming temperature extremes.

MUST hospitals have modern operating room lights, well-illuminated wards, a plastic-like flooring that is cleaned with a wet vacuum cleaner, and a self-contained air-conditioning and heating system. Complex and delicate surgery can be performed in the first of the three MUST elements, providing 206 square feet of space.

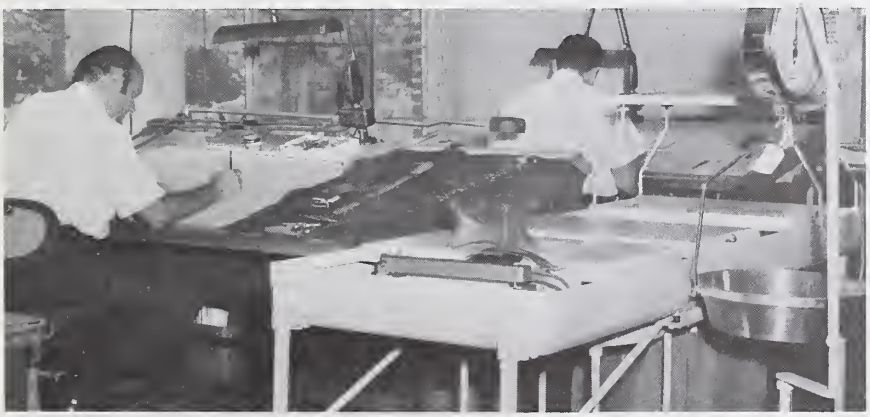
The second element provides utilities—electricity, heating and air-conditioning. Outside temperatures may drop to —65 or soar to +120° F. without varying the comfort of space within the hospital.

The third element is an air-inflatable unit that expands into a giant ward when several units are connected to meet specific requirements.

Five partially equipped MUST hospitals are now serving in Vietnam, each providing 60 beds for patients treated by Army medics. The Navy has two 40-bed MUST hospitals for Marines.

The U.S. Army Materiel Command has undertaken testing of a new MUST component, a Water and Waste Management System. Early in 1970 testing is planned on a MUST Food Service System, including a dining room for the staff and ambulatory patients.

Other equipment developed for the MUST includes pharmacy, X-ray and dental facilities, sterile preparation rooms, and a clinical laboratory.



MERDL draftsmen draw plans for portable field autopsy table (foreground)

Army R&D Leaders Take Lead Roles in EASCON; Apstein Receives HDL Award

Army research and development leaders figured prominently in the 1969 Electronics and Aerospace Systems Convention and Exposition (EASCON), Oct. 27-29, in Washington, D.C., under sponsorship of the Institute of Electrical and Electronics Engineers.

Highlighting the keynote session was an address by Maj Gen Walter E. Lotz Jr., CG of the Army Electronics Command, former CG of the Army Strategic Communications Command, and an early Director of Army Research.

Presentation of the Harry Diamond Laboratories (HDL) Memorial Award was another opening session feature. Dr. Maurice Apstein, HDL associate technical director, was recognized for "contributions to ordnance electronics and inspiring leadership in the work of government laboratories." Dr. Apstein is an Army career scientist.

Army Chief Scientist Dr. Marvin E. Lasser was chairman and organizer of the opening technical session on Optical Sensor Systems. Two of the five presentations on this topic were given by U.S. Army Night-Vision Laboratory personnel.

"Advancement in Night-Vision Systems Using Pulse-Gated Viewing and Laser-Ranging Techniques" was coauthored by T. Jordan, R. Riordan and R. Stanekenas. "Analysis and Measurement of the Noise Limited Performance in an Infrared Imaging System" was coauthored by NVL scientist J. M. Lloyd and R. L. Sendall, Electro-Optical Systems, Pasadena, Calif.

Victor L. Friedrich, Assistant for Electronics to the Assistant Secretary of the Army, was chairman and organizer of the session on Terrestrial Communications. One of the six technical papers was by ECOM coauthors Capt Robert M. Glorioso, 1st Lt Grant R. Grueneich and 1st Lt Joe C. Dunn.

Deputy Director Peter T. Maresca, responsible for engineering development at the U.S. Army Satellite Communications Agency, Fort Monmouth, N.J., chaired and organized the Satellite Communications Technology session.

Two of four technical papers featured on the Communications Power Sources session were given by personnel from HQ Army Electronics Command (ECOM). Dr. Galen E. Frysinger, chief, Power Sources Division, ECOM Electronic Components Laboratory, spoke on "Power Sources for Long Economic Life of Communications Equipment." David Linden of the same division presented "A Mechanically Rechargeable Zinc-Air Battery."

Dr. Maurice Apstein

Dr. Marvin E. Lasser

Maj Gen W. E. Lotz Jr.

A third paper in this session was "The DoD Mobile Electric Power Program," Col J. J Rochefort Jr., U.S. Army, Department of Defense project manager for the program. The other presentation was by Joseph D. LaFleur Jr., Atomic Energy Commission, on "Communication Satellite Nuclear Power Sources."

ECOM scientists W. Fishbein and O. E. Rittenbach coauthored one of seven technical papers at the session on "Radar," chaired and organized by Dr. Merrill I. Solnik, superintendent, Radar Division, Naval Research Laboratory, Washington, D.C. They reported on "Multifunction Radar Waveforms."

Senator Barry M. Goldwater gave one of the principal addresses at the conference luncheon session Oct. 29, speaking on matters significantly important to scientists, engineers, executives and military personnel involved in aerospace and electronic systems research and development.

Frank Borman, commander of NASA's first around-the-moon Apollo 8 flight, was featured at the session on Earth Orbiting Manned Space Stations. This session included eight presentations by top leaders of the NASA space program and industrial leaders associated with this effort.

More than 70 technical papers were presented during the conference by many of the nation's most renowned industrial defense contractors, academic scientists and engineers, and U.S. Government officials.

Col Pearce Assigned as MICOM Deputy CO for LCS

Col Robert M. Pearce, formerly commander of the 4th Armored Division Artillery in Europe, is the deputy commander for Land Combat Systems, HQ U.S. Army Missile Command. Col Cyril D. Sterner vacated the position when he retired from active military duty.

Col Pearce was director, Research and Development, Army Missile Command (1965–66), project manager for the Shillelagh missile system (1964–65), and Combat Developments Command liaison officer to the Army Missile Command (1962–64).

Other key assignments have included: chief, Pershing Operational Test Unit, U.S. Army Europe; U.S. Army War College, Carlisle Barracks, Pa.; commander, First Battalion, 42d Artillery (Honest John), Korea; Office of the Army Chief of Research and Development as chief of the Ballistic Missile Branch and project officer for the Pershing, Redstone and Jupiter missiles. He also served with the Armed Forces Special Weapons Command, Sandia, N. Mex.

Col Robert M. Pearce

After two years at the University of Louisville, he was appointed to the U.S. Military Academy and graduated in 1944 with a degree in military engineering. He then served with the 871st Field Artillery Battalion, 66th Infantry Division, in Europe.

Col Pearce received a master's degree in aeronautical engineering in 1948 from New York University. He also is a graduate from the Army's Basic Artillery Officer's Course, the Advanced Artillery Officer's Course, the Command and General Staff College and the Army War College.

OTSG Change Termed 'Monumental Step'

Establishment of the Office of Special Assistant to The Surgeon General for Medical Corps Affairs, announced Oct. 17, was termed "a monumental step forward in Army Medical Corps activities."

Army Surgeon General (Lt Gen) Hal B. Jennings selected Brig Gen Thomas J. Whelan Jr., MC, former chief, Department of Surgery at the U.S. Army Tripler General Hospital in Hawaii, as the officer fully qualified by experience and temperament to fill this newly created position.

General Whelan has been cited for exceptional professional ability, elected to Fellowship in the American College of Surgeons, Southeastern Surgical Congress, American College of Angiology, and the American Surgical Association, and has contributed more than 30 papers to medical literature.

Months before the office was officially opened, General Whelan visited U.S. Army hospitals and talked with Medical Corps officers in all types of assignments to learn firsthand what was right and what was wrong with the career management of doctors in the Army. He found out why some doctors remain on active duty while others leave, and what influenced their decisions.

General Whelan has tailored his staff to preserve the favorable aspects of military medicine and to eliminate or correct the deficiencies as far as feasible within the military framework. He has appealed to Medical Corps officers he did not interview personally, inviting them to talk to him or to write about their career interests.

General Whelan has a secondary responsibility as director of Professional Service, with Col William G. Dunnington, MC, as deputy.

With the reorganization of the Directorate of Personnel and Training (DPT), Col Bedford H. Berrey, MC, formerly deputy of that directorate, became deputy to General Whelan. Its Medical Corps Branch was transferred to the Office of the Special Assistant for Medical Corps Affairs as the Medical Corps Career Activities Division, with Col Dwight F. Morss Jr., MC, as chief.

Brig Gen Thomas J. Whelan Jr.

The former DPT Professional Education Branch is now the Office of Graduate Medical Education, directed by Lt Col Joseph D. Lloyd, MC.

Beginning next July, 103 straight internships will be offered in Army Internship Programs: 51 in medicine, 21 in surgery, 17 in pediatrics, 7 in obstetrics and gynecology, and 7 in pathology. These will be listed in the new AMA Directory of approved Internships and Residencies (Green Book).

A few of the current residency programs still have openings, and applications will be considered if submitted to the Special Assistant for Medical Corps Affairs.

MUCOM CG's Aid Marks 50-Year Picatinny Span

Half a century of association with Picatinny Arsenal, from his first assignment to his retirement as commanding officer after 35 years service, to his present duties as consultant to the commanding general, Army Munitions Command, was observed recently by Col John P. Harris.

Twenty of those years since 1919 were served at Picatinny in six different capacities—18 as an officer, two in his current position. He had served in nearly every division and branch of the arsenal up to the time he became commander in 1948, including duty as chief, Industrial Division and deputy commander (1946–48).

"Mr. Ammunition" became his unofficial title when he was assigned in 1937, as a captain, to head a planning branch of the Army Ordnance Corps in Wilmington, Del. Hitler was then moving across Europe and the planning task called for establishment of 500 ammunition plants within a limited time—"for all-out war mobilization," Harris recalls.

In recognition of his heroic actions in rescuing employes from the devastating explosion at Picatinny Arsenal in 1926, Col Harris became the first recipient of the U.S. Army Soldiers Medal. His part in reconstruction of facilities earned a "Mr. Picatinny" sobriquet.

Following his retirement from active duty, Col Harris was selected by then Secretary of the Army Henry Marsh to serve as captain of a team of some 40 ammunition specialists in the Foreign Military Facilities Assistance Program in Europe, designed to expand NATO-connected munitions plants throughout Western Europe.

In 1966, after an 8-year retirement from Federal Civil Service employment, he responded to a bid from Maj Gen Floyd A. Hansen, then CG of the Munitions Command, to assume his present duties as consultant.

How long will he stay? "Well as long as they need me and I can do some good for the ammunition program, I'll be here."

CONSULTANT John P. Harris and Maj Gen F. G. White, MUCOM CG.

Eifler Gets Third Star Before Leaving MICOM

Army Chief of Staff General William C. Westmoreland pinned the three stars of a lieutenant general on Charles W. Eifler, former CG of the U.S. Army Missile Command, prior to his departure to become deputy to the Commander-in-Chief, U.S. Army Europe, in October.

General Eifler later received the first Oak Leaf Cluster to the Distinguished Service Medal (DSM) for "exceptional and inspiring leadership" of the Army's missile program while assigned at Redstone Arsenal.

Speaking briefly at each ceremony, General Eifler praised the personnel of the Missile Command for their cooperation and support.

He was first honored with the DSM for his outstanding work as CG of the 1st Logistical Command, U.S. Army in Vietnam. Lt Gen Henry Miley, Deputy CG of the U.S. Army Materiel Command, presented the OLC to the DSM to General Eifler in a ceremony in AMC Headquarters.

Quad Cities' 12-Year Effort Produces Graduate Study Center

GOVERNING BOARD, Quad Cities Graduate Center (from left) Dr. Carmelo Sapone, graduate director, Marycrest College; Eugene E. Burks, assistant general manager, Instrument and Life Support Division, Bendix Corp.; Dr. F. R. Geigle, executive vice president, Northern Illinois University; Dr. Roye R. Bryant, assistant chancellor, Southern Illinois University; Dr. C. W. Sorensen, president, Augustana College; Dr. Colin M. Hudson, chief scientist and deputy for Research and Engineering, U.S. Army Weapons Command; Sister Marie Ven Horst (PhD), chairman, Division of Natural Science and Mathematics, Marycrest College; Robert M. Hetherington, vice president for Operations, Iowa-Illinois Gas & Electric Co.; David C. Gibson, manager for Personnel Research, Deere & Co.; Dr. Eldon L. Johnson, vice president, University of Illinois; Dr. Robert F. Ray, dean, Division of Extension and University Services, University of Iowa; Dr. George C. Christensen, vice president for Academic Affairs, Iowa State University; Herbert C. Sumner, manager, Research Services, Deere & Co.; Dr. Carlson E. Crane, dean, Division of Public Services, Western Illinois University. Other members of the board, not present when picture was taken, are Philip D. Adler, copublisher of Davenport Times Democrat; Jack Sundine, editor of the Moline Daily Dispatch; and William J. Kearney, chairman of the executive committee, Rock Island Bank & Trust Co.

U.S. Government-academic-industrial cooperative effort for 12 years in programs to update engineering, scientific and managerial capabilities of employes, mainly of the U.S. Army Weapons Command, culminated recently in establishment of the Quad Cities Graduate Study Center.

Considered by its joint founders as a unique education enterprise, the center is at Augustana College, Rock Island, Ill., near the Weapons Command HQ at Rock Island Arsenal. Nine colleges and universities are "Governing Participants."

Army Corps of Engineers HQ for the Rock Island District also are on Arsenal Island and the engineers have long been active in planning for and participating in the graduate study program.

Since the center became operational in September, more than 1,000 students have enrolled in more than 50 courses, leading to master's degrees in engineering, mathematics, business administration, and education at present. As employe needs are identified, the program will be expanded.

Dr. Virgil W. Alexander was appointed director of the center by a board of nine educators from participating universities and seven representatives of industry and U.S. Government agencies in the Quad Cities-Davenport, Iowa; Rock Island, Moline and East Moline, Ill.

Dr. Alexander has been prominent in activities that led to establishment of the center, dating to 1957 when the Quad Cities Technical Advisory Council was incorporated as a not-for-profit corporation to foster advanced education programs. He was the first director and then dean of the Evening College at Northern Illinois University, which has since been renamed the College of Continuing Education.

Invited to serve initially as "Governing Participants" are the University of Illinois, Southern, Northern and Western Illinois Universities, State University of Iowa, University of Iowa, University of Northern Iowa, Marycrest College and Augustana College.

Any university which does not meet the criteria for Governing Participant status within 18 months converts to Associate Participant status.

Composition of the governing board of the center includes three U.S. Army representatives, with nine appointees from the Quad Cities Development Group and eight at-large appointees from the Quad Cities.

Weapons Command Chief Scientist and Deputy for R&E Dr. Colin M. Hudson is a member of the board and serves with Col Leonard Orman, director of WECOM Research and Engineering, on the 15-member Quad Cities Council for Graduate Education.

Edwin M. Vaughan (Lt Col, USAR), chief of the Scientific Information Division, Research and Development Directorate, WECOM, was among leaders in activities that culminated in establishment of the center. He was president of the Quad Cities Technical Advisory Council until it was dissolved in August 1969.

Basic to the concept of the center is that programs leading to master's degrees or to other advanced education requirements are planned to minimize time lost by students in transit to a university campus. Instructors for Weapons Command students come to the Army Materiel Command's Management Engineering Training Agency (AMETA) or to other Rock Island training facilities, where classrooms and library services are provided.

When it is not feasible for the instructor to go to AMETA, arrangements are made for video tape or electro writer instruction, which enables the instructor to be observed or to communicate with students during the lessons. Classes usually are from 4:00 to 10:00 p.m.

With respect to the on-campus residence requirement for an MS degree the problem is resolved by permitting students to attend on-campus Saturday sessions or to attend on-campus classes for one semester.

Under the U.S. Army Advanced Education Program, government funding is provided for tuition of

Army employes, but they must pay for their books and for any travel expenses.

Several industrial organizations in the immediate area of the center also encourage employes to upgrade their capabilities for career advancement by subsidizing, in varying degrees, their enrollment in the graduate study program. Since population of the Quad Cities exceeds 250,000, substantial expansion of this participation is anticipated.

Noncredit courses and special lectures or seminars are incorporated in the over-all concept of the center's operations. In the respect, top managers and leading scientists and engineers of such major industrial organizations as Deer and Co., Bendix Corp., Iowa-Illinois Gas and Electric Co., Collins Radio Co., International Harvester Co., Aluminum Co. of America, and others are available as speakers.

Complexities of the endeavor of establishing the center, the Governing Board concedes, preclude detailed long-range planning. It is contemplated that the total project, including objectives and the curriculum (such as PhD programs), will be reviewed and modified during the first three years of experimental operation "in the light of experience."

CSC Claims $3.078 Million Incentive Award Savings

Adopted suggestions that saved an estimated $195,962,977 and special achievements valued at $111,859,506, were reported as FY 1969 results of the U.S. Government Incentive Awards Program were assessed.

Other intangible values cited are scientific advancement, improved service to the public, and more effective accomplishment of programs.

The program is administered by the Civil Service Commission. Chairman Robert E. Hampton said:

"We need to place continued emphasis on cost control throughout the government. This report indicates that federal employes are indeed cost-conscious and that they are doing their part to give the taxpayer a good return on his tax dollar."

Adopted suggestions reached an all-time high of 147,093 and suggestors received $4,978,146 for ideas.

The 110,647 Special Achievement Awards granted also set a new record. The average cash award for achievements was $157; total awards amounted to $15,705,920.

The top award of $25,000 went to the late Albert W. Small of the National Security Agency for "inventions of exceptional value" in advancing the state-of-the-art and the productivity of American cryptographic systems.

A Bureau of Standards physicist in Boulder, Colo., earned $1,000 for developing a means of measuring distance with laser beams, accurate to less than a quarter-inch in measuring the distance to the moon.

Notable accomplishments in the suggestion program were made by:

- *Army*, with more than $76.4 million in first-year benefits from more than 28,000 adopted suggestions—a 36 percent increase over 1968.
- *Air Force*, with $60.9 million in benefits from more than 19,000 suggestions adopted—a 38 percent increase over 1968.
- *Navy*, with $32.4 million in benefits from 20,000 suggestions.

Five other agencies topped the million-dollar mark—Post Office, $7.1 million; NASA, $5.3 million; Defense Supply Agency, $2.9 million; Treasury, $1.5 million; and Agriculture, $1.4 million.

Cash awards, in addition to the maximum award earned by Small of NSA, included the following:

- $15,000 to a 5–member group at Army's Picatinny Arsenal for development of more effective ammunition.
- $11,685 to an equipment specialist at the Army Ammunition and Procurement Supply Agency in Joliet, Ill., for suggesting a way to renovate ammunition for current usage, at a $10,632,100 saving in manhours and material.
- $5,150 to two Air Force employes for suggesting a way to save $4,098,742 by using parts and equipment from a terminated computer program to reduce the need for spare parts in an ongoing program.

Other significant awards included:

- $1,475 to a Defense Supply Agency quality assurance representative in Dallas who changed the construction of the sleeve used in tropical combat coats to save $424,668 per year.
- $1,200 to a senior pilot of the Panama Canal Company who suggested that by using 2–way radios, two pilots could do the work previously requiring four in piloting ships of certain construction through the Canal.
- $1,030 to an office machine operator with the Internal Revenue Service in Ogden, Utah, who suggested using larger rolls of microfilm at an annual saving of $75,700.
- $1,175 to a female inventory management specialist in the Naval Ordnance Systems Command who suggested a way to modify available transmitters and avoid the new purchase cost of 30 transmitters at $5,000 each.

Army Evaluates UFP Structures at MERDC

Preliminary testing of a Universal Folded Plate (UFP) structural system at the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va., has produced results indicative of broader utility than most modular construction systems.

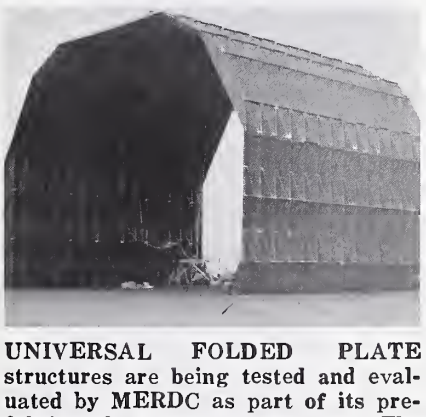
The UFP basic panels, either metal or reinforced plastic, can be joined easily to form structures of varied design and size to meet special military or civilian requirements.

U.S. Army Materiel Command officials have reached a licensing agreement with Arpad Kolozsvary, a New Jersey inventor, that will permit manufacture of the product worldwide for use by the Department of Defense.

The basic building block of the system is a folded diamond plate, units of which can be connected in reversed as well as in identical relative fold positions, by optionally reversing some of the components' fold positions. Thus a "virtually limitless variety of structures" can be assembled from identical components.

Metal and plastic plates can be used in combination to provide minimum weight or for optional light transmission. Plates are bolt-connected and waterseal at the joints is obtained by extruded compressible elastromeric gaskets, which are adhesive bonded all around the plate's free edges.

The Mobility Equipment R&D Center has been using panels of 10- and 18-gauge steel and reinforced plastic in the limited, stepped-up program of testing to date. More definitive testing and evaluation will be done on a structure 70 by 90 feet.



UNIVERSAL FOLDED PLATE structures are being tested and evaluated by MERDC as part of its prefabricated structures program. The building above has plates of 10-gauge steel. It has a 52-foot stand, a center height of 38 feet and is 40 feet long.

U.S.-Canadian Defense DSP Representatives Tour R&D Installations

In furtherance of objectives of the United States-Canadian Defense Development Sharing Program (DSP), 5 representatives of these nations toured 12 U.S. Army R&D installations during recent weeks.

The purpose was to familiarize the U.S. activities with the program through briefings and to discuss the research and development capability in Canada. Initiated in 1959, the DSP supports the U.S.-Canadian Defense Production Sharing Program, and enables Canadian industry to participate in R&D of U.S. military gear.

Installations toured by the briefing team included the Natick (Mass.) Laboratories; Army Materials and Mechanics Rsearch Center, Watertown (Mass.) Arsenal; Picatinny Arsenal, Munitions Command, Dover, N.J.; Frankford Arsenal, Philadelphia, Pa.; Electronics Command Laboratories, Fort Monmouth, N.J.; and Harry Diamond Laboratories, Army Materiel Command, Washington, D.C.; Mobility Equipment R&D Center, and Night-Vision Laboratories, Fort Belvoir, Va.; Aviation Laboratories, Fort Eustis, Va.; HQ Missile Command, Redstone (Ala.) Arsenal; Aviation Systems Command, St. Louis, Mo.; Weapons Command, Rock Island (Ill.) Arsenal; Tank-Automotive Command, Warren, Mich.

Lt Col Leslie H. Weinstein, U.S. Army Standardization Group, Canada, headed the briefing team, including Elmer L. Claussen, International Development Division, U.S. Army Materiel Command; J. C. Bond, W. E. Grant and C. B. Smith, International Defence Programs Branch, Canadian Department of Industry, Trade and Commerce.

Under terms of the DSP agreement, U.S. and Canadian Government agencies may nominate projects for joint development in accordance with existing directives. Projects accepted are formalized by agreement stating the cost-sharing arrangement and work to be performed. Projects selected are 1) designed to meet specific Department of Defense requirements, 2) jointly funded by the U.S. and Canada, 3) performed by Canadian prime contractors, and 4) subject to U.S. design authority.

Responsibility for U.S. Army implementation of the DSP rests with the Assistant Secretary of the Army (R&D), with HQ DA General Staff supervision exercised by the Chief of Research and Development.

U.S. agencies designated by the Secretary of the Army to participate in the program are the Army Materiel Command, Army Security Agency, Office, the Chief of Engineers, and Office of The Surgeon General.

Instructions pertaining to the DSP are contained in Army Regulation 1–25 (Apr. 25, 1964) and Army Materiel Command Regulation 1–13 (Feb. 5, 1965). Actually, the program dates to 1941 when President Franklin D. Roosevelt of the U.S. and Canadian Prime Minister McKenzie King met at Hyde Park and jointly declared a coordinated effort to mobilize the resources of both countries quickly and efficiently.

Following the end of World War II, the agreement was reconfirmed by a joint statement of principles for economic cooperation. When the 1958 production-sharing pact was signed, restrictions were reduced with respect to cross-border trade in materiel, encouraging Canada to purchase major weapons systems in the United States.

Canadian industry was given an equal opportunity to compete with U.S. firms for U.S. defense contracts in certain specialized areas, "with the ultimate goal of broadening the overall North American production base."

In 1963, the DSP was updated by a memorandum of understanding of cooperative development, "to assist in

AVSCOM Monitors Order By Canada for 50 'Copters

Purchase of 50 twin-engine Bell CUH-1N helicopters for use by the Canadian armed forces, made through the U.S. government with the Army Aviation Systems Command as administrator, was recently announced.

The CUH-1N is the 15-place latest version of the UH–1 Huey family of Bell helicopters, powered by the United Aircraft of Canada's Pratt and Whitney PT6T Turbo Twin-Pac. Militarily designated the T400, the package produces 1,800 hp for takeoff.

The aircraft will have a certified gross weight of 10,000 pounds internally and 10,500 externally, with a cruising speed of 120 mph. Its sea-level range will be 259 nautical miles with 10 percent reserve.

The Canadian government has cooperated with United Aircraft of Canada and Textron's Bell Helicopter Co. in development of the engine, which also will power U.S. Air Force, Navy and Marine UH-1Ns.

MERDC Employes Rotate in Lab Assistance Program

Vernon W. Urie

Under the Army's Vietnam Laboratory Assistance Program, Vernon W. Urie, chief of the Value Engineering Branch, U.S. Army Mobility Equipment R&D Center, will depart this month for Vietnam to spend six months on research.

Working with officers and enlisted men, he will try to determine in what manner the MERDC can be of greater assistance to troops be the technical representative of the project by Jack T. Stevenson, who will return to the center after six months in Vietnam.

Urie will represent the MERDC parent command, the U.S. Army Mobility Equipment Command (MECOM), St. Louis, Mo., and be the technical representative of the project manager, Mobile Electric Power (PMMEP), Command, Vietnam (MACV) Scientific Advisory Group with the Military Assistance

As the MECOM representative, Urie will ascertain what the R&D Center can do to be of greater assistance in the fields of bridging and assault stream crossing, fire fighting, construction and materials handling equipment, prefab buildings, and waste disposal, heating and air-conditioning.

Other areas of interest will include camouflage and concealment, physical security, mine warfare, barrier and intrusion detection, demolitions, petroleum storage and distribution, water purification, land navigation, industrial engines and power generation, adequacy of present generators, and whether or not modifications are required.

As chief of the Value Engineering Branch, the veteran of 19 years Civil Service has an excellent understanding of MERDC capabilities and equipment it has developed and has under development to improve the Army's mobility. He entered Civil Service in 1941 and was employed at the Naval Torpedo Station, Alexandria, Va., until he transferred to the R&D Center at Fort Belvoir in 1950. He served as an Air Force pilot in World War II.

maintaining the Defence *Production* Sharing Program at a high level, by making it possible for Canadian firms to perform R&D work undertaken to meet requirements of U.S. Armed Forces."

The agreement further defines objectives as "to utilize better the industrial, scientific and technical resources of the United States and Canada in the interests of mutual defenses; to make possible the standardization and interchangeability of a larger amount of the equipment necessary for the defense of the United States and Canada."

The U.S. Army Standardization Group is representative of the Office of the Chief of R&D and is located with the Canadian Forces Headquarters in Ottawa, Canada. Headed by Col J. D. Park, the group consists of nine officers, each representative of a different branch of the U.S. Army. They work with Canadian counterparts to achieve DSP objectives.

With few exceptions, the U.S. Army must be prepared to provide at least 25 percent of the funding for approved projects. The equipment should have a comparative high-density or high-dollar volume production potential, and a requirement properly established in accordance with current U.S. Army regulations.

Further specified is that no duplicate or competitive development within the U.S., utilizing appropriated funds, is under consideration to meet the same requirement; also, the item must be in a field in which Canada has or can establish a development capability.

Canadian agencies most involved in DSP include the Department of Industry, Trade and Commerce; Department of National Defence and its R&D Establishment, the Defence Research Board; Department of Supply and Services, primarily a procurement agency; National Research Council, which is mainly concerned with the civil R&D effort; and the Treasury Board, which is the final authority for funding.

Operating within the framework of the Department of Supply and Services, Canada's sole procurement agency, is the Canadian Commercial Corporation, a government-owned and operated body which negotiates contracts with other countries. Canada appropriates $25 million annually for the total cooperative development activities under the current program.

Deseret Test Center Jointly Develops Diagnostic Tool to Identify Disease Carriers

Technology acquired on programs sponsored by the Deseret Test Center, Fort Douglas, Utah, has led to development of new diagnostic tools that serve as "detectives" in identifying presence of disease-causing viruses.

The minute sensitized latex beads were developed jointly by scientists at Deseret Test Center and the Aerojet-General Corp., El Monte, Calif. Virologists will be able to detect, isolate and identify viruses and antibodies in a fraction of the time now required, without resorting to the usual complex and time-consuming laboratory procedures, Deseret officials report.

Importance of the discovery in ordinary medical practice is perhaps best demonstrated by application of the sensitized beads in detecting previous exposure to Rubella virus, the cause of German measles. The latex test simplifies detection of maternal immunity to German measles.

If a woman contracts German measles during the first three months of pregnancy, there is a great chance that the baby will be aborted, stillborn or born with congenital abnormalities. The most common birth defects in affected children are heart and nervous system deficiencies, cataracts and permanent blindness.

Another diagnostic test under development by Aerojet scientists, using fluorescent antibody methods developed in part on a Deseret Test Center sponsored program, allows the physician to determine not only the mother's immunity to German measles, but how recently she was exposed.

This is achieved by testing the mother's blood with two selected anti-human antibodies, IgG and IgM. If the mother's Rubella antibody attaches to IgM, the patient has recently had the disease. If it attaches to IgG, the disease occurred in the distant past. No attachment indicates that the mother is susceptible to the disease.

This historical data on the presence of the disease, achieved for the first time, provides information vital to proper treatment of the mother and her unborn child.

The latex beads can be sensitized with either antigens or antibodies. Antigens detect the presence of antibodies to a specific disease. Antibodies detect the disease-causing virus itself.

Antigen-coated beads react with antibodies if present in the blood sample and then clump. The clumping reaction simplifies the detection and analysis process.

Beads coated with antibodies will attract the viruses themselves. Aerojet scientists are now perfecting a method for the removal of the virus from the beads so that a pure virus suspension can be achieved.

The ability to identify, economically purify and concentrate viruses is of major significance in public health applications such as the production of vaccines, quick diagnosis of disease and water pollution control.

The latex beads can be sensitized to detect a large variety of viruses, including those causing respiratory illnesses, gastroenteritis, encephalitis and pneumonia. They also show promise in the recovery and identification of viruses from contaminated foods.

Col Macpherson Becomes Assistant to USAREUR CG

Special Assistant to Lt Gen Charles W. Eifler, new CG of the U.S. Army Europe, is the new title of Col William J Macpherson, until recently director of Supply and Maintenance, HQ U.S. Army Missile Command at Redstone (Ala.) Arsenal.

During tours totaling seven years at Redstone, Col Macpherson has served as director, Department of Research and Curriculum, U.S. Army Ordnance Guided Missile School (1960–61), assistant commandant and then commandant of the school (1961–65).

Col William J. Macpherson

Prior to assignment to Redstone in 1967, he was deputy chief of staff for maintenance, HQ Eighth U.S. Army Depot Command in Korea.

A native of Brunswick, Ga., he graduated from Clemson A&M College with a BS degree in mechanical engineering in 1942 and entered the Army.

Col Macpherson has graduated from the associate and nuclear weapons employment courses at the Command and General Staff College, Fort Leavenworth, Kans., the atomic electronics course at Field Command AFSWP, Sandia Base, N. Mex., and the basic and advanced courses at the Infantry School, Fort Benning, Ga.

AUSA Meeting Stresses Forces of Change Reshaping U.S. Army

Forces of change rapidly reshaping the U.S. Army of today and the foreseeable future dominated the tone of major speeches and panel discussions at the 15th annual meeting of the Association of the United States Army, Oct. 13–15, in Washington, D.C.

More than 7,000 Army career personnel and industrial representatives assembled to hear addresses by top military leaders and to view exhibits of new equipment and industrial capabilities for defense requirements.

Major speakers included General Earle G. Wheeler, Chairman of the Joint Chiefs of Staff; Secretary of the Army Stanley R. Resor; General William C. Westmoreland, Army Chief of Staff; General F. J. Chesarek, CG of the U.S. Army Materiel Command; General Bruce Palmer, Army Vice Chief of Staff; and former Secretary of the Army Stephen Ailes, AUSA Council of Trustees.

AUSA President Frank Pace Jr., former Secretary of the Army, presented the "President's Report" and presided as toastmaster at the General George C. Marshall Memorial Dinner. Former Secretary of the Army Elvis J. Stahr, AUSA Council of Trustees, was toastmaster at the annual luncheon and the Sustaining Members Luncheon.

"Progress in Vietnam," a panel discussion, was moderated by Lt Gen Richard G. Stillwell, Army Deputy Chief of Staff for Operations. Panel members were Lt Gen Julian Ewell, CG II Corps, Military Assistance Command Vietnam (MACV); Maj Gen George S. Eckhardt, commandant, Army War College and George Jacobson, Civilian Operations and Revolutionary Developments, MACV.

Stephen Ailes moderated a panel discussion on "Are Volunteer Forces Feasible?," featuring former Selective Service Director Lewis B. Hershey, Senator Richard S. Schweiker (R.-Pa.) and the Hon. W. Sterling Cole, former vice chairman, Civilian Advisory Panel on Military Manpower Procurement.

Former Deputy Secretary of Defense Cyrus R. Vance, also a former Secretary of the Army, was presented the AUSA's highest award, the George Catlett Marshall Medal, in recognition of many years of exceptional military and civilian service. Currently he has been serving as deputy chief of the U.S. negotiating team at the Paris peace talks.

Dignitaries at the head table for the AUSA annual luncheon included Stephen Ailes, General of the Army Omar N. Bradley, General Westmoreland, Under Secretary of the Army Thaddeus R. Beal, Dr. Elvis J. Stahr, Army Chaplain Brig Gen Ned R. Graves, and General James K. Woolnough, CG, U.S. Continental Army Command; General John L. Throckmorton, Commander-in-Chief, U.S. Strike Command; Lt Gen George V. Underwood. CG, U.S. Army Air Defense Command; Lt Gen Jonathon O. Seaman, CG, First Army; Lt Gen Albert O. Connor, CG, Third Army; Lt Gen Vernon P. Mock, CG, Fifth Army; Lt Gen Stanley R. Larsen, CG, Sixth Army; Lt Gen Harry Critz, CG, Fourth Army; and Maj Gen Roland Gleszer, CG, Military District of Washington.

GENERAL WHEELER'S ADDRESS. In a moving tribute to the qualities that established the greatness of General George Catlett Marshall, on the occasion of the tenth anniversary of his death, Oct. 16, Chairman of the Joint Chiefs of Staff General Wheeler said his remarks "are equally applicable to Cyrus R. Vance."

General Wheeler also likened the current public dissent with the war in Vietnam to the period prior to U.S. entry into World War II which prompted General Marshall, in testifying before a Committee of the Congress July 22, 1941, to state:

"At the present moment we are undergoing a very depressing, a dangerous experience. Yesterday afternoon I received a radiogram from General Drum (Lt Gen Hugh A. Drum) that he had issued these orders as Commander of the First Army:

" 'There appears to be an organized effort from some source outside the Army to have petitions signed by members of the military forces and sent to the Congress in an effort to oppose legislation proposed by the War Department to continue the service of the National Guard and the Reserve officers in the service. Any such action by those in military service violates the provisions of Army Regulation.' "

General Wheeler quoted General Marshall as saying to Congress, in part: ". . . We must enforce disciplinary measures to offset such influences if the Army is to have any military value of dependability as an Army. Without discipline an army is not only impotent, but is a menace to the state. I do not want to see our young men victimized, misled into unsoldierly conduct; I want to see them handled so that we can build up a splendid American Army. . . ."

Perhaps the most resoundingly applauded quip during the AUSA meeting was General Wheeler's reference to the "Academic-Journalistic Complex" and its role in fomenting criticism of the "Military-Industrial Complex."

KEYNOTE ADDRESS. Secretary of the Army Resor opened his keynote address with a report on the status of the war in Vietnam and the growing power of the South Vietnamese Army to assume an increasing combat role.

"In spite of these trends in Vietnam," he said, "the enemy believes that time is on his side here in the United States. He believes that he can win this war, as he won his war against the French, through collapse of our resolve to continue.

"Clearly we have the resources to outlast him. But do we have the will—the will to adhere to a sensible and deliberate withdrawal rather than a hasty and headlong one? For our will and perseverance are the sole questions in the equation. . . ."

Secretary Resor devoted much of his speech to the problems of racial integration in the Army, stressing that "no racial tensions appear in those areas where troops are in direct contact with the enemy. Color is not a factor in the fire bases in Vietnam. The readiness of the Army to carry out its mission remains unimpaired. . ."

Negro soldiers, Secretary Resor emphasized, must be treated with the same consideration, the same respect and privileges, the same understanding to bring out their best qualities and abilities, and with the same discipline as any other soldier.

GENERAL WESTMORELAND discussed development of the Air Cavalry role in Vietnam and progress of the U.S. Army in learning to fight the kind of jungle war in which the enemy is highly skilled. He talked about R&D activities that have contributed significantly to this ability, with emphasis on new night-vision devices, sensors and intelligence collection means.

"Based on our total battlefield experience and our proven technological capability," he said, "I foresee a new battlefield array . . . combat areas that are under 24-hour real- or near-time surveillance of all types . . . on which we can destroy anything we locate through instantaneous communications, and the almost instantaneous application of highly lethal firepower.

"I see a continuing need for highly mobile combat forces to assist in fixing and destroying the enemy. . . . I see the forward end of the logistics system with mobility equal to the supported force. I see the elimination of many intermediate support echelons and the use of inventory-in-motion techniques. I see some Army forces supported by air—in some instances directly from bases here in the Continental United States."

GENERAL CHESAREK quoted extensively from a recent address by Director of Defense Research and Engineering Dr. John S. Foster Jr. (see page 2) as applied to current problems of maintaining technological and materiel superiority over any potential enemy, in view of current severe reductions in R&D funding.

Other highlights of General Chesarek's address included a report on progress during the past year in meeting Vietnam requirements, the role of the new STANO program (see page 1 article), current emphasis on reduction in weight of materiel (particularly the combat soldier's load), the need for more comprehensive planning in very early stages of materiel development, and improvements in computer systems geared to Army requirements.

Army Tests Heliborne Fire-Suppression System

Delivery of a prototype heliborne fire-suppression system that will allow the evacuation of persons trapped in a crashed and possibly burning aircraft was announced by the Army in mid-October.

Tested in some 70 experimental fires, the system has successfully allowed aero-medics to remove dummies from fire-engulfed wreckage in about 25 seconds. In actual conditions, persons extracted from the downed aircraft would be airlifted to medical facilities while receiving inflight medical attention.

Ten of the special kits, produced by Textron's Bell Helicopter Co. of Fort Worth, Tex., have been delivered to Fort Rucker, Ala., for evaluation by the Army Aviation Test Board. Participating in the testing program are the Army Aviation Center and Aero-Medical Research Labs.

Flown on an Army/Bell UH-1D or H (civilian Model 205A) aircraft, the system is designated to meet Army Aero-Medical Service mission requirements for crash/rescue service at sites where 100 or more landings or takeoffs occur in a 24-hour period.

The fire-suppression kit consists of two 25–gallon or 50–gallon tanks containing a special "light water" concentrate that mixes with plain water; a telescoping boom for discharging the resultant foam; emergency extraction equipment, and provisions for three litter and two ambulatory patients.

The helicopter is manned by a pilot, copilot and/or crew chief, senior medical aide and a fire fighter. Once at the crash scene, the aircraft is capable of cutting a 15 by 40–foot rescue path in eight to ten seconds; extricating injured personnel in 25 to 30 seconds; and loading injured and taking off in one minute and 10 seconds.

To offer full crash-rescue support, the fire-suppression helicopter will be capable of accompanying troop-carrying helicopters on missions.

During an en route emergency, the aircraft would leave the formation and accompany the disabled aircraft to the ground. When a crash occurs, the fire-suppression chemical is applied to disperse any fuel vapor. R. S. Stansbury, Bell project engineer for the system, states that many safety personnel expect such quick response may prevent more fires than it suppresses.

Under the current program, Bell is training four Army pilots who in turn will serve as instructors for some 30 crews. A 6–month deployment phase will begin in February when the system becomes operational at Fort Rucker and the Hunter-Stewart Army Air Field complex at Savannah, Ga.

The second phase field testing will cover some 600 flight hours. It is expected that the system eventually will be used at Fort Rucker, Hunter-Stewart, Fort Wolters, Fort Bragg and Fort Hood Army facilities.

The system also has civilian application for use at airports and for fighting forest fires. It has an advantage over fire trucks in that it can be used over a wide area, including remote sites inaccessible to trucks and surface ambulances. Such a system, it is pointed out, could be utilized to keep forest fires from spreading.

UH–1H helicopter sprays fire-supressing foam during tests of a system designed for evacuation of persons from crashed and burning aircraft.

CH–54B Helicopter Increases Transport Capability

Flight testing of a U.S. Army CH–54B helicopter carrying a gross weight of 47,000 pounds, more than 27,000 pounds above its empty weight, a 5,000–pound increase over that of the CH–54A, was announced recently.

Two CH–54Bs are undergoing rigorous flight tests at the Sikorsky Aircraft Co. Stratford, Conn., plant before delivery in 1970. Sikorsky has produced more than 65 CH–54As and CH–54Bs for the Army.

CH–54As have been used in Vietnam since 1965 to recover downed aircraft and transport heavy equipment. Nicknamed the Tarhe after a Wyandot Indian chief who was called "the Crane" the CH–54A is informally termed "the flying crane."

The CH–54B is powered by two Pratt and Whitney Aircraft T73–P–700 turbine engines, each capable of 4,800 horsepower, compared with the 4,500 maximum horsepower of the CH–54A. Other improvements include a high-lift rotor blade and new gear box able to receive 7,900 horsepower, 1,300 over the CH–54A.

CH–54B Helicopter

Medics Report Results Of Meningitis Vaccine

Continued progress in the development of a vaccine to combat meningitis is reflected in recent statistics released by the Army.

HQ U.S. Army Medical Research and Development Command, Washington, D.C., reported approximately 14,000 volunteer recruits in the Army have received the new vaccine to fight "Group C" meningococcal organisms, which during the past three years caused more than 90 percent of the meningitis cases in the military. Groups A and B total 10 percent.

Of the 14,000 recruits immunized with the vaccine, only five have contracted meningococcal infections. One infection of the five was caused by Group C organisms, and the other by Group B. In contrast, at least 41 cases —38 caused by Group C organisms— have occurred in 50,000 unimmunized recruits.

Meningococcal illness is a particular threat to military recruits who live and train in close quarters. Some 200 per 100,000 recruits get the disease each year as compared to 1.5 to 1.7 per 100,000 each year in the U.S.

Medical care in Army basic training camps emphasizes early diagnosis and treatment. Each recruit who complains of acute respiratory disease symptoms is suspected of having meningitis and is treated fast.

As a result of the quick treatment, mortality rates from meningococcal infections in military personnel are well below those in the civilian population: 7 to 10 percent as compared to 26 to 29 percent.

Army researchers caution that although initial results from the vaccine look good, more testing is needed.

AMC Picks Dr. El-Bisi Chief, Science & Technology

Appointment of Dr. Hamed M. El-Bisi as chief of the Science and Technology Division, Research, Development and Engineering Directorate, HQ Army Materiel Command, Washington, D.C., was announced Oct. 17.

Dr. El-Bisi was chief of the Microbiology Division, Natick (Mass.) Laboratories, Army Materiel Command from 1963 until he moved to HQ AMC. He gained international recognition for research on bacterial endospore physiology and kinetics of their thermal death.

The 43–year-old Egyptian-born scientist is known as an authority on the microbiological aspects and principles of radiation preservation of food and as an advocate for the potential utilization of microbial systems as unconventional food sources.

Graduated from the University of Ein Shams in Cairo with a BS degree (with honors), he came to the United States in 1950 to attend the University of Illinois, where he earned both an MS degree in 1952 and doctorate in 1955, majoring in microbiology, biochemistry and food science.

Dr. Hamed M. El-Bisi

Returning to Cairo in March 1955, Dr. El-Bisi lectured and supervised graduate research in applied and basic microbiology at the University of Ein Shams. He also was an adviser to the Egyptian government on industrial development programs.

In 1956 he was invited to serve at the University of Illinois as a research associate and remained on the graduate study faculty until December 1957. He then joined the graduate faculty and research staff at the University of Massachusetts, as an assistant and then as an associate professor until July 1963. While at Amherst, he served as a member of the Joint Quadripartite Graduate Faculty of the University of Massachusetts, Amherst, Smith, and Mount Holyoke Colleges.

Dr. El-Bisi has been a frequent lecturer at many universities and a participant at national and international symposia. He participated in a Space Summer Study Program at the University of Iowa in 1962 to analyze and advise on NASA's R&D program, plans and objectives. In 1966 he was an invited speaker before the International Botulism Symposium and the IX International Congress of Microbiology in Moscow. In 1968 he spent six months in Southeast Asia as a consultant to Dr. William G. McMillam, science adviser to the CG of U.S. Forces in South Vietnam.

Dr. El-Bisi's new AMC assignment makes him responsible for staff supervision of assigned projects in research and exploratory development in the atmospheric and earth sciences; night-vision devices, aerodynamics, ballistics, explosives, pyrotechniques, chemistry, mathematics, mechanics, physics, electronics, materials, and advanced energy conversion in the physical science; wound ballistics, human factors and engineering in the behavioral and life sciences.

Author and coauthor of more than 50 scientific research papers, he is a member of the American Society for Microbiology, American Association for the Advancement of Sciences, American Institute of Biological Sciences, American Public Health Association, Institute of Food Technologists, and the Scientific Research Society of America.

Laird Reveals Selection Of N.D. Safeguard Sites

Selection of tentative sites for Safeguard Antiballistic Missile System facilities in the Grand Forks, N. Dak., area was approved by Secretary of the Army Stanley R. Resor and announced in October by Secretary of Defense Melvin R. Laird.

Action to require the sites will not be taken until Congress passes the FY 1970 Defense Appropriation Act. Tentative sites are in Pembina, Cavalier and Walsh Counties, about 60 miles from Grand Forks.

Facilities to be established at the first Safeguard ABM System sites will include a Perimeter Acquisition Radar (PAR), a Missile Site Radar (MSR) with its associated Spartan and Sprint missiles, two remote Sprint missile launching sites, and support facilities.

U.S. Army personnel are scheduled to visit the areas in the near future for on-site and local surveys. Negotiations also will be conducted by the Army with local utility companies. Information will be collected in discussions with civic and community leaders regarding schools, hospitals, housing and other accommodations for personnel moving into the areas.

Committees on Armed Services of the Senate and the House of Representatives will be advised of the Army's desire to acquire the specific land necessary for establishment of the Safeguard ABM System facilities.

Col Canfield Commands Communications System Agency

Command of the U.S. Army Communications Systems Agency, Fort Monmouth, N.J., was assumed recently by Col William D. Canfield, who had served as deputy to Maj Gen Hugh F. Foster Jr.

Col Canfield served with HQ, Seventh U.S. Army and Seventh U.S. Army Support Command (1966–68), following an assignment as commander of the Twelfth Signal Group, Germany (1964–66).

Other assignments in recent years have included service as Army representative on the Army-Navy Packaging Board; chief of the Packing Branch in the Signal Corps' Procurement and Distribution Division; head of the Signal Maintenance Operations Branch in Headquarters, U.S. Army Far East; system analyst with the Armed Forces Supply Support Center in Washington, D.C.; and senior adviser, Signal Base Depot, Republic of Korea (1957–58).

Col William D. Canfield

Col Canfield is a graduate of the Industrial College of the Armed Forces, the Command and General Staff College and the Signal Officers Advanced School. He received a BS degree in military science with a minor in business administration from the University of Maryland in 1958, and MBA degree in business management from George Washington University in 1962.

He has been awarded the Legion of Merit, the Bronze Star Medal with Oak Leaf Cluster, and the Army Commendation Medal (4 OLCs).

GETA Tests 25,000-Barrel Fuel Storage Reservoir

Integrated year-long engineering and service testing of a 25,000–barrel hasty bulk fuel storage reservoir is being conducted at Fort Lee, Va., by the U.S. Army General Equipment Test Activity.

Four of the elastomer-coated fabric tanks under development by the U.S. Army Mobility and Equipment Research and Development Center, Fort Belvoir, Va., are being tested by elements of the U.S. Army Test and Evaluation Command.

Intended for use in theaters of operations where temporary petroleum storage facilities are needed, the test units are aimed at lightening the Army's logistics load. Employment in the field is expected to reduce shipping requirements, construction time and much of the need for skilled manpower at construction sites.

The 25,000–barrel reservoir, for instance, can be installed in about 20 percent of the time required to construct conventional bolted steel tankage of like capacity (1,050,000 gallons). The huge, envelope-type container, which weighs approximately 6,200 pounds when empty, is designed for installation by engineer construction troops and for operation by Quartermaster POL units.

A 25,000-barrel hasty storage fuel reservoir is placed in position on the revetment by a 20-ton rough-terrain crane equipped with spreader bar.

Installation of the largest of the reservoirs began with the excavation of a trapezoidal pit. Site preparation included construction of a continuous revetment or berm to provide lateral support. When filled to capacity, the tank is 92.5 feet wide, 185 feet long and 13 feet high.

Supporting equipment furnished with the reservoir includes an 8–inch inlet-outlet manifold assembly, a volumetric flowmeter, a dewatering equipment set and items for use in installation, operation and maintenance.

Engineering tests will evaluate the technical characteristics of the reservoir through operation in an actual fuel pumping system. Studies to be undertaken include laboratory analyses of fuel samples to determine if fuel contamination occurs from contact with the synthetic construction material. Materials analysis testing of exposed and unexposed samples of the fabric will be performed to determine effect of fuels and exposure on the material.

Service testing is slated to begin when satisfactory progress has been achieved in the engineering test and a safety release has been issued.

Thirty-five soldiers lend a hand to spread storage reservoir in the pit.

7 Army Personnel Present Papers at Fourth IECEC

Seven technical papers featured at the Fourth Intersociety Energy Conversion Engineering Conference in Washington, D.C., Sept. 22–26, were presented by Army personnel.

Simultaneous sessions were held on Dynamic Cycles-Rankine; Dynamic Cycles-Brayton; Space Power; Biomedical Power; Thermionic Power; Heat Pipes; Power conditioning; Nuclear Power and Hybrids; Electrochemical Power; Underwater Power; and Transportation and User Requirements.

The Army's principal interest was in sessions on Rankine cycle and electrochemical power, as related to upcoming decisions on selection of systems for power units from .5 kw up to 5 kw. One of the criteria is a goal of 5,000 hours of operation before overhaul.

Data are still lacking on the 1,000- to 5,000-hour range of operation before overhaul. The Mobility Equipment Research and Development Center, Fort Belvoir, Va., is making a study of systems for more extensive development of generators in the .5 kw to 5 kw range.

The only long lifetime Rankine cycle engine shown at the conference was a hydrocarbon boiler designed for fluorinated hydrocarbons of the Freon variety. This boiler had operated successfuly for periods of 2,000 hours without failure, but the working fluid had to be kept below 400° F. to prevent decomposition which leads to major maintenance problems.

One of the significant papers of interest to the Army for power in the .5 kw to 5 kw range was that by O. J. Adlhart and P. L. Terry of Englehard Minerals and Chemicals Corp. on an ammonia air fuel cell system that uses a phosphoric acid matrix.

The cell is simple in respect to heat and water balance because it operates above 100° F. and uses nearly water-free ortho-phosphoric acid as an electrolyte. Tests to date have demonstrated that it has very long life.

Papers presented by U.S. Army personnel and the titles follow: Life and Performance Characteristics of Pbte Couples in Hydrocarbon Fired Systems, A. Herchakowski, Army Electronics Command (ECOM), Forth Monomouth, N.J.; New Low-Temperature Batteries, N.T. Wilburn and R.L. Almerini, ECOM; Reserve Type Organic Elctrolyte Batteries, K.A.M. Braeuer, ECOM; and

Power Processing and Control for Military Manpack Fuel Cell Power Sources, W. B. Kempler and M. E. Cannon, ECOM; Ultra-Reliable Power Processor for Hydrocarbon-Air Fuel Cell Power Systems, M. S. Kosmin, ECOM; The Hydrazine-Air Bi Cell, A Simplified Fuel Cell System, J. Perry Jr. and L. J. Rogers, ECOM; and

Department of Defense Mobile Electric Power Program, M. J. Aiken, U.S. Army Materiel Command, G. B. Wareham, Office of the Director of Defense Research Engineering, and T. G. Kirkland, Mobility Equipment R&D Center.

Watervliet Arsenal Research Recognized By International Metallographic Society

Two of eight first place awards at the International Metallographic Society's recent exhibit at San Francisco recognized Watervliet (N.Y.) Arsenal research.

The awards presented to Watervliet for outstanding microphotographs of metal structures were shared by four researchers of the Maggs Research Laboratory whose studies of metal failure caused by fatigue are allied to the arsenal's effort to obtain stronger metals for use in weapons components.

Selected from more than 100 entries from the United States, England and West Germany, the arsenal's exhibits were prepared by research physical metallurgist John Underwood, metallographer Theresa Brassard, research mechanical engineer R. Vincent Milligan, and Charles DeLaMater, a physical science technician.

Underwood and Mrs. Brassard displayed "Crack-Tip Deformation in Mild Steel Measured by Optical Interference," first place winner in the unique and unusual techniques classification. It shows how an optical interference technique is used to measure the asymmetrical plastic deformation around a fatigue crack in a steel bar under tensile load.

Milligan and DeLaMater's first place award for a display titled "65–35 Alpha Brass," was earned in the color photomicrograph classification. By using a potassium chromate etchant, sensitive tint illumination and color photography, the researchers were able to better definition of the microscopic structure of the brass, not possible by conventional methods.

WATERVLIET ARSENAL metallographer Theresa Brassard displays microphotograph that won first place at international Metal'ographic Society exhibit. John Underwood, research physical metallurgist, holds metal bars displayed in the exhibit selected from more than 100 entries.

Mrs. Brassard earned another award in October when her microphotograph, "Canyon Diabalo Meteorite," won first prize in the color microphotograph classification at the American Society for Metals Metallographic Exhibit at the 1969 Materials Engineering Exposition in Philadelphia.

The winning exhibit featured a color photograph taken through a microscope of a metallic piece of the Canyon Diabalo Meteorite found on the rim of Meteor Crater, Ariz. The fragment was supplied through the courtesy of Dr. Walter W. Walker of the University of Arizona.

Mrs. Brassard polished and chemically etched the fragment with potassium metabisulfite to reveal the metallic structure, mostly iron, which recrystallized as the meteorite struck the earth. A special type of lighting (polarized sensitive tint illumination) enables the different types of iron and nickel metal present in the meteorite to be clearly observed.

Wear to Command CDC Infantry Agency

Col George E. Wear took command of the U.S. Army Combat Developments Command (CDC) Infantry Agency, Nov. 1, after serving as director of instruction, Infantry School, Fort Benning, Ga.

The assignment makes him responsible for coordinating requirements relating directly to the Infantry combat effectiveness, including direction and control of CDC activities associated with individual soldiers.

A graduate of the U.S. Military Academy, Col Wear began his active military career in 1944 during World War II, serving with the 424th, 109th and the 3d Infantry previous to a tour of duty at Fort Benning.

After an assignment as a battalion commander with the 31st Infantry Regiment in Korea, he returned to West Point as an instructor (1954–57), then attended the Armed Forces Staff College before assignment as Plans and Operations Officer, Southern European Task Force, Italy.

Assigned to HQ DA in the Pentagon for three years, he then served two years with the 5th Mechanized Division at Fort Carson, Colo., and afterward became brigade commander, 4th Infantry Division in Vietnam.

A 3-time recipient of the Combat Infantryman's Badge and wearer of the Master Parachutists Badge, Col Wear is a graduate of the Command and General Staff College, Armed Forces Staff College, and the Army War College. His decorations include the Silver Star, Legion of Merit, Bronze Star with Oak Leaf Cluster, Air Medal with 10 OLCs, Purple Heart and the Vietnamese Gallantry Cross.

Col George E. Wear

Brig Gen Sidle Succeeds Coats As Chief of Information, HQ DA

Brig Gen Winant Sidle became Chief of Information, HQ Department of the Army, Oct. 27, succeeding Maj Gen Wendell J. Coats, now CG of the 2d Armored Division, Fort Hood, Tex.

General Sidle returned in mid-October from the Republic of Vietnam, where he served a year as Chief of Information for the U.S. Military Assistance Command, Vietnam (MACV) and a year as CG of the I Field Force Artillery. Before going to Vietnam in August of 1967, he was Director for Defense Information in the Office of the Assistant Secretary of Defense for Public Affairs.

Graduated from Hamilton College, Clinton, N.Y., he has an MS degree from the University of Wisconsin.

RDT&E, Procurement Contracts Exceed $550 Million

Three contracts with Western Electric Co. aggregating $81,709,488 for Safeguard Antiballistic Missile System R&D and continuation of radar measurements in support of Kwajalein National Missile Range are included in Army RDT&E and procurement orders totaling $550,899,514 from Sept. 1 to Oct. 15. Only contracts exceeding $1 million are listed.

Philco-Ford Corp. received three contracts totaling $39,554,653 for Shillelagh missiles and for equipment and research and development work on the Chaparral missile system.

Remington Arms Co., Inc., was awarded $38,350,443 (four contracts) for 5.56mm, 7.62mm cartridges, and for loading, assembling and packaging of ammunition. FMC Corp. will receive $31,936,540 for vehicles.

National Presto Industries, Inc., won a $30,775,307 contract for 105mm projectile parts. Chamberlain Manufacturing Corp. will be paid $26,345,154 (six contracts) for ammo.

Chrysler Corp. is receiving $24,909 000 for M60A1 tanks, M728 combat engineer vehicles and repair and production equipment; Honeywell, Inc., will get $18,789,494 (four contracts) for grenade fuzes; Ford Motor Co. will receive $17,313,669 for ¼-ton trucks.

General Motors Corp. was awarded six contracts totaling $16,324,893 for M551 assault vehicles, M109, 155mm howitzers, diesel engines and transmission assemblies. Hercules, Inc., gained two contracts for $13,828,682 for propellants and explosives.

Raytheon Co. was issued two contracts totaling $11,085,166 for equipment and engineering services for the Hawk missile system. R. G. LeTourneau, Inc., was awarded a $10,374,000 contract for 750-pound bomb parts.

Contracts under $10 million. Federal Cartridge Corp., $9,945,050 (two contracts) for small arms ammunition; Donovan Construction Co., $9,590,880 for 155mm projectile parts; United Aircraft Corp., $9,435,002 for CH–54B helicopters with air particle separators; and

Day and Zimmerman, Inc., $8,395,350 to load, assemble and pack 105mm cartridges; American Machine and Foundry Co., $6,914,200 for 750-pound bomb parts; Bulova Watch Co., $6,748,793 for fuze parts; and

Bell Helicopter Co., $6,625,000 for CUH-1N helicopters; Firestone Tire and Rubber Co., $6,239,500 for cartridges and projectiles; Martin Marietta Corp., $5,766,000 for Pershing missile components and power station R&D; Olin Mathieson Chemical Corp., $5,602,150 for 5.56mm cartridges.

Contracts under $5 million. Continental Motors Corp., $4,693,354 (three contracts) for engineering support and remanufacture of multifuel engines for trucks, and for kit cylinder sleeves and piston assemblies; Eisen Brothers, Inc., Lodi, N.J., $4,614,086 for projectile parts; and

Honeywell, Inc., $4,500,000 for electronic equipment; General Dynamics Corp., $3,954,275 for engineering services for the Redeye missile system; Boeing Co., $3,867,870 (two contracts) for support services for CH–47 aircraft; Amron Corp., $3,557,338 for 40mm cartridge cases; Uniroyal, Inc., $3,415,366 for cluster bombs; Mason and Hanger, Silas Mason Co., Inc., $3,391,374 for loading, assembling and packing of detonators and grenade fuzes; and

Kennedy Van Saun Corp., $3,343,-338 for projectile parts; Applied Devices Corp., College Point, L.I., N.Y. $3,262,500 for radar station Hawk simulators; and

REDM Corp., Wayne, N.J. $3,133,-528 (two contracts); AVCO Corp., $3,063,395 (two contracts); Amron-Orlando Corp., $3,020,832, all for fuze parts; and

AAI Corp., Cockeysville, Md., $2,-953,500 for 40mm grenade launchers; Bendix Corp., $2,932,500 for power supply sets for the Pershing missile system; General Time Corp., $2,871,-000 for fuze parts; Wells Marine, Costa Mesa, Calif., $2,745,300 for links for 7.62mm machinegun belts; Jacks-Evans Manufacturing Co., St. Louis, Mo., $2,736,000 for 7.62mm machinegun belt links; and

Farmers Chemical Association, Inc., Tyner, Tenn. $2,689,050 for acids; Levinson Steel Co., Pittsburgh, Pa., $2,609,550 for projectile parts; Medico Industries, Inc., Wilkes Barre, Pa., $2,415,000 for warhead parts; Heckethorn Manufacturing Co., Dyersburg, Tenn., $2,309,708 for projectile parts;

Atlantic Research Corp., Alexandria Va., $2,214,324 for Redeye rocket motors; ZD Products Division of Wells Marine, Inc., $2,140,820 for metal parts for fuzes; Wilkinson Manufacturing Co., Fort Calhoun, Neb., $2,119,838 for fuze parts.

Contracts under $2 million. Sperry Rand Corp., $1,938,500 for demolition charges and antipersonnel mines; Hayes Albion Corp., $1,932,00 for 81mm projectiles; Rulon Co., Chicago, Ill., $1,865,694 for fuze parts; and

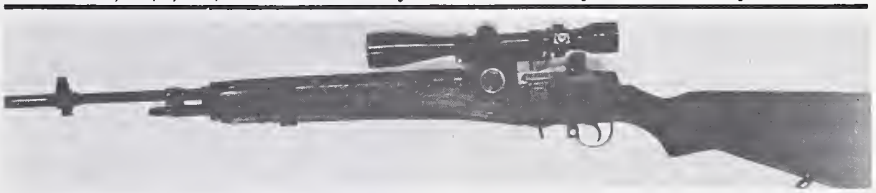
Stewart-Warner Corp., $1,558,275 for 60mm projectile parts; Brunswick Corp., $1,514,501 for clips for 66mm incendiary rockets; Campbell Chain Co., York, Pa. $1,512,631 for tire and cross chains; Pace Corp., $1,510,810 for surface flares; and

Collins Radio Co., $1,500,000 for electronics work; Scovill Manufacturing Co., $1,499,148 for grenade fuzes; Hercules Engines, Inc., $1,385,666 for multifuel engines for 5-ton trucks; Barry L. Miller Engineering, Hawthorne, Calif., $1,372,500 for 7.62mm machinegun belt links;

North American Rockwell Corp., $1,370,998 for work on U.S. Army Materiel Command Technical Data Configuration Management Systems; George K. Garret Co., Philadelphia, Pa., $1,359,000 for links for 7.62mm machinegun belts; Cadillac Gage Co., $1,352,676 for Commando V–100 armored cars; and

Bell Aerospace Corp., $1,317,450 for technical services for installing and servicing the Environmental Data and Processing Facility; Bell and Howell Co., $1,229,850 for grenade fuzes; Hughes Tool Co., $1,207,460 forOH-6A helicopters; Wilkinson Manufacturing Co., Fort Calhoun, Neb., $1,165,500 for projectile parts; E. D. Etnyre Co., Oregon, Ill., $1,126,477 for distributors; Bucyrus-Erie Co., $1,114,154 for 12½-ton shovel cranes; and

Marquardt Corp., Van Nuys, Calif., $1,110,959 for 66mm rocket warheads and precision liners; Metatronics Manufacturing Corp., Hicksville, N.Y., $1,044,765 for containers for Shillelagh missiles; and Standard Research Institute, $1,000,000 for continued study for ABM systems.



IMPROVED ACCURACY is built into this new U.S. Army sniper rifle, the XM21, a modified version of the M14 National Match rifle weighing 11 pounds with a loaded 20-round magazine. At 300 meters, the average extreme spread for three consecutive 10-shot groups is within six inches. Rebuilt by the Fabrication Technology Division, Rock Island (Ill.) Arsenal, U.S. Army Weapons Command, the XM21 has a variable power (3X to 9X) commercial sight. The U.S. Army Limited War Laboratory, Aberdeen (Md.) Proving Ground, developed standards for modification of sniper rifle-mounted telescopes.

35 Staff Officers Report for Duty With Office of Chief of R&D

Thirty-five replacements for staff officers rotated to new assignments reported for duty recently with the Office of the Chief of Research and Development, HQ DA. Most served recently in Vietnam.

Seven oficers were assigned to the Directorate of Army Research, 5 to Plans and Programs Directorate, 12 to the Developments Directorate, 5 to Missiles and Space Directorate, 3 to the Advanced Ballistic Missile Defense Agency, and one to the Technical and Industrial Liaison Office. Two officers were reassigned within the Behavioral Science Research Laboratory and OCRD.

ARMY RESEARCH OFFICE (USARO). *Lt Col Frank H. Duggins Jr.* is chief, Studies Branch, Studies and Analyses Division, following three years as commandant, Military Academy Preparatory School, Fort Belvoir, Va. He was senior adviser with the Military Assistance Command, Vinh Binh Province, Vietnam (1965–66) and project officer, Combat Developments Command Infantry Agency at Fort Benning, Ga. 1962–65).

A 1950 graduate from the U.S. Military Academy (USMA), he has a BS degree in aerospace engineering from Mississippi State University (1962), and completed the Command and General Staff College (C&GSC) in 1960. His military honors include the Legion of Merit, (LOM), Bronze Star Medal (BSM) w/V device, Oak Leaf Cluster (OLC), Air Medal (AM w/ 3 OLC, Army Commendation Medal (ARCOM) w/ OLC, Republic of Vietnam (RVN) Cross of Gallantry, Combat Infantryman Badget (CIB) w/ Star, and the Purple Heart.

Lt Col Leo V. Warner Jr. completed a tour of duty as chief, Plans and Analyses Division, Office, Assistant Chief of Staff for Transportation, 1st Logistical Command, Vietnam, prior to assignment to the Studies and Analysis Division, USARO.

He graduated from the USMA in 1955, earned an MS degree in aerospace engineering from the Massachusetts Institute of Technology (MIT) in 1963, and completed the C&GSC in 1967.

Recent assignments include duty with the Cayuse Project Manager's Office, U.S. Army Materiel Command (AMC), Washington, D.C. (1965–68), and as S–3 and executive officer with the 202d Transportation Battalion in Korea (1963–64). He holds the BSM and the ARCOM.

Lt Col P. J. Hickey is assigned to the Behavioral Sciences Division. Returned recently from Vietnam, he served with the 4th Infantry Division and the 1st Logistical Command.

During 1966–68 he was an associate professor at the USMA, from which he graduated in 1949. He has an MS degree in industrial relations from Purdue University (1965) and is a graduate of the C&GSC (1959).

His decorations include the Silver Star (SS), LOM, Distinguished Flying Cross (DFC), BSM w/2 OLC, AM w/3 OLC, ARCOM w/OLC, CIB w/star, and the Purple Heart.

Lt Col Stanley R. Meeken was CO of the 31st Engineer Group (C) at Fort Carson, Colo., until assigned to the Physical & Engineering Sciences Division, USARO.

He has SB (1950) and SM (1951) degrees in chemical engineering from MIT, completed the C&GSC extension course in 1966, and served as assistant professor of military science at Drexel Institute of Technology (1964–66).

Other recent tours of duty were with the Construction Directorate, MACV (1967–68); U.S. Army Research Support Group, Fort Belvoir, Va., and Greenland (1962–64); and the Division of Reactor Development, U.S. Atomic Energy Commission, Germantown, Md. (1960–61). He holds the LOM and ARCOM w/1st OLC.

Maj Edward E. Chick completed the C&GSC prior to assignment to the Physical & Engineering Sciences Division, USARO.

He served as CO, 1st Battalion, School Brigade, U.S. Army Missiles and Munitions Center and School at Redstone Arsenal, Ala., subsequent to a tour with the 709th Maintenance Battalion at Fort Riley, Kans., and in Vietnam.

Service in Korea followed duty as special projects officer with the U.S. Army Materials Research Agency at Watertown, Mass. (1963–64). From September 1960 to June 1961 he was assistant S–3, 209th Artillery Group, and Commanded B Battery, 4th Missile Battalion, 333d Artillery, Fort Sill, Okla.

Maj Chick earned BS (1953) and MS (1964) degrees in metallurgical engineering from Lehigh University. He holds the BSM and ARCOM.

Maj Curtis G. Unger, serving with the Life Sciences Division, recently received an MA degree in chemistry from the Johns Hopkins University. He has a BA degree (1961) in language and BS degree (1958) in chemistry, both from Jacksonville State University.

He was assistant adjutant general, U.S. Army Support Command, Saigon (1966–67) and commanded the 22d Chemical Company, Fort Hood, Tex., and Long Binh, Vietnam (1965–66). He has served with the 2d Armored Division at Fort Hood, Tex., the U.S. Army Chemical Center and School at Fort McClellan, Ala., and the 3d Infantry, Division, Wurzburg, Germany.

Maj Harold S. Osborne completed

USMA Assigns Medsger as Research Director

Director of Research at the United States Military Academy became the new title of Col Gerald W. Medsger when he recently succeeded Col John S. Howland upon his retirement from military service.

Col Medsger was associate professor and executive officer, Department of Mathematics at the academy until reassigned to his new duties. He is a 1948 graduate from the USMA, has an MS degree in civil engineering from the University of California (1957), an MS in physics from New York University (1968), and is a Command and General Staff College graduate.

He has served as chief, Electronics Branch, U.S. Army Airborne, Electronics and Special Welfare Board; resident engineer, U.S. Army Eastern Ocean Engineer District in Labrador; assistant professor of military science, Missouri School of Mines and Metallurgy; instructor at the U.S. Army Engineer School; and with construction units (two tours) in Germany.

Col Gerald W. Medsger

A registered professional engineer in the State of Missouri, Col Medsger is a member of the American Society of Civil Engineers, National Society of Professional Engineers, American Society for Engineering Education, the Mathematical Association of America, Society of American Military Engineers, and is a Fellow of the American Association for the Advancement of Science. He is listed in *Who's Who in Engineering.*

the Medical Department Career Course at the Medical Field Service School, Fort Sam Houston, Tex., before he was assigned to the Life Sciences Division.

He served with the Armed Forces Institute of Pathology in Washington, D.C., subsequent to a tour with the 20th Preventive Medicine Unit and the 61st Medical Detachment in Vietnam (1966–67).

Other assignments have included: Walter Reed Army Instute of Research, Washington, D. C.; 5th Evacuation Hospital, Fort Bragg, N.C, Medical Unit, Fort Detrick, Md.; and 196th Station Hospital (Paris) and 42d Field Hospital, Verdun, France.

He has a BA degree (1956) in biology from East Tennessee State University and an MS degree (1963) in parasitology from the University of North Carolina. He was awarded the BSM for service in Vietnam.

PLANS & PROGRAMS. *Lt Col Guy E. Jester*, a newcomer to the Plans Divison, recently served with the 9th Infantry Division in Vietnam.

A 1951 graduate of the USMA, he has MS (1958) and PhD (1969) degrees in structural dynamics and engineering from the University of Illinois. He completed the C&GSC in 1962 and the Army War College (AWC) in 1968.

From 1965 to 1968, he was deputy and acting director of the Waterways Experiment Station at Vicksburg, Miss., following tours as an instructor and assistant professor at the USMA. He served with the Northern Area Command in Schweinfurt and Frankfort, Germany, from 1958 to 1961.

He has been awarded the LOM, BSM w/3 OLC and V device, AM w/2 OLC, ARCOM w/OLC, Civic Action Honor Medal w/OLC, Armed Forces Honor Medal w/OLC, and the Purple Heart.

Maj William J. Westhoff commanded the 559th Engineer Detachment at Long Binh, Vietnam, until assigned to the Plans Division, OCRD.

He earned a BS degree in geophysical engineering from the Colorado School of Mines in 1955, MS degrees in civil and nuclear engineering from the University of Illinois in 1963, and graduated from the C&GSC in 1968.

He was chief, Idaho Nuclear Power Field Office at Idaho Falls (1965–67), plans officer for the Engineer Section, Eighth U.S. Army in Korea (1963–64) and served with the 1st U.S. Army Missile Command in Vicenzo, Italy (1959–61).

Maj Westhoff has received the BSM and the ARCOM/w OLC.

Lt Col John F. Wall returned from Vietnam for an assignment to the Management & Evaluation Division.

Graduated from the USMA in 1956, he earned an MS degree in civil engineering from Princeton University in 1961, and completed C&GSC in 1967.

From 1967 to 1968 he was executive officer, 91st Engineer Battalion at Fort Belvoir, Va., and was a research associate at the Lawrence Radiation Laboratory at Livermore, Calif., from 1964–66.

His military honors include the LOM, BSM, AM w/3 OLC, ARCOM, RVN Technical Service Medal and RVN Engineer Badge.

Maj Earl H. Talley completed the C&GSC course prior to his assignment to the Management & Evaluation Division, OCRD.

He has a BS degree in electrical engineering from the Virginia Military Institute (1958) and an MS degree in aerospace engineering from Georgia Institute of Technology (1967).

He was S–1, Aviation Battalion, Vietnam (1967–68) and operations officer, Airmobile Company and company commander, Infantry Company in Germany (1962–64). He has been awarded the BSM and AM.

Maj John T. Brantley, assigned as a staff officer with the Budget Branch, Programs & Budget Division, until recently served in Vietnam as senior audit adviser.

He earned an MBA degree from Syracuse University in 1968 and an AB degree from William and Mary College in 1958. He was budget and fiscal officer, HQ Joint U.S. Military Aid Group, Greece (1964–66); served with the 82d Airborne Division, Fort Bragg, N.C. (1960–62); and was an instructor at the U.S. Army Finance School, Fort Benjamin Harrison, Ind. (1962–64).

Maj Brantley has received the BSM, JSCOM w/OLC, RVN Commendation Medal, Vietnam Service Medal, Vietnam Honor Medal (1st Class), and National Defense Service Medal.

DEVELOPMENTS DIRECTORATE. *Lt Col John F. Zugschwert* was assigned to the Air Mobility Division upon completion of the C&GSC course. He recevied a BS degree in business administration from St. Benedict's College, Atchison, Kans. (1968).

He has served as S–3, 269th Combat Aviation Battalion in Vietnam (1967); operations officer and CO, Southern European Task Force (SETAF) Aviation Company, Verona, Italy (1965); and S–3, 101st Aviation Battalion, Fort Campbell, Ky. (1964).

Among his awards and citations are the DFC w/2 OLC, BSM w/OLC, AM w/11 OLC, ARCOM, VN Honor Medal (1st Class), and VN Cross of

(*Continued on page 22*)

Condit Commands Combat Service Support Group

Brig Gen Ross. R. Condit Jr., new commander of the Combat Service Support Group, U.S. Army Combat Developments Command, Fort Lee, Va., last served as deputy director of Logistics, Joint Staff, Office of the Joint Chiefs of Staff.

General Condit is a graduate of the Command and General Staff College, the Armed Forces Staff College, the Industrial College of the Armed Forces, and has attended the University of Maryland.

Prior to assignment to the Office of the Joint Chiefs of Staff, he served with HQ U.S. Army Europe and the Seventh Support Command in Germany. In June 1965, he was assigned to the Military Assistance Advisory Group as senior adviser to the J–4, Joint General Staff, Republic of Vietnam Armed Forces.

He became assistant commandant after serving as director of instruction and director of doctrine at the Ordnance Center and School at Aberdeen Proving Ground, Md. Earlier he served four years with the Office of the Deputy Chief of Staff for Logistics in Washington, D.C., including duty as chief, Plans and Policy Branch, Materiel Maintenance Division.

General Condit entered the service in 1942 and was with the 14th Armored Division at Fort Chaffee, Ark., and in Europe during World War II, until transferred to 4th Armored Div.

After the war, he served with the 70th Ordnance Group and the 1st Infantry Division in Europe. Subsequently, he was deputy ordnance officer, Army Section, Military Assistance Group, Taiwan.

His awards and decorations include the Legion of Merit with Oak Leaf Cluster (OLC), Bronze Star Medal, Air Medal, and the Army Commendation Medal with Oak Leaf Cluster.

Brig Gen Ross R. Condit Jr.

35 Staff Officers Report for Duty With OCRD

(*Continued from page 21*)

Gallantry w/Palm.

Lt Col Robert W. Noce, new chief of the Combat Arms Branch, Combat Materiel Division, served a second tour in Vietnam following graduation from the Industrial College of the Armed Forces (ICAF) in 1968.

A 1959 graduate of the USMA, he has an MS degree in mechanical engineering from Georgia Institute of Technology (1959), and completed the C&GSC in 1963. He was the U.S. test coordinator in the Office of the U.S. Program Manager, United States/ Federal Republic of Germany (US/ FRG) Tank Development (1965–67) and has served with the General Test and Combat Vehicle Divisions of the U.S. Army Armor and Engineer Board, Fort Knox, Ky.

Lt Col Noce has been awarded the LOM w/OLC, BSM w/V device and 2d OLC, Air Medal w/1st thru 17th OLC, Joint Services Commendation Medal (JSCOM), RVN Cross of Gallantry w/Silver Star, and RVN Staff Service Medal, 1st Class.

Lt Col Carmelo P. Milia served with the 5th Mechanized Division in Vietnam prior to assignment to the Combat Arms Branch. He was Department of the Army System Staff Officer (DASSO) for the Sheridan/ Shillelagh tank/weapon system (1967–68), assistant G–2, V Corps, Germany (1965–66); and was earlier chief of Combat Material (Armor), Combat Developments Command (CDC) Agency, Fort Knox, Ky.

Graduated from the USMA in 1950, he earned an MS degree in mechanical engineering from Georgia Institute of Technology in 1960, and completed the C&GSC in 1966. He holds the SS, LOM/w OLC, BSM w/OLC, AM w/OLC, Purple Heart, and RVN Cross of Gallantry.

Lt Col James V. Irons was commanding officer, 2d Battalion, 505th Infantry, 82d Airborne Division in Vietnam until assigned to the Combat Arms Branch.

From 1966 to 1968 he served with the 82d Airborne Division at Fort Bragg, N.C., as CO of the 2d Battalion, 508th Infantry, and as G–1, following three years with the Office of the Assistant Chief of Staff for Intelligence, Washington, D.C.

Graduated from the USMA in 1950, he completed the C&GSC in 1961 and earned an MS degree in mechnical engineering from Mississippi State in 1963. He holds the SS, LOM, BSM, AM w/5 OLC, ARCOM, and the CIB.

Lt Col Clifford Worthy Jr. commanded the 1st Battalion, 83d Artillery, and was earlier S–4, XXIV Corps Artillery, Vietnam, prior to assignment to the Combat Arms Branch.

A 1953 graduate of the USMA, he earned an MS degree in mechanical engineering from the University of Arizona (1964) and completed the C&GSC course in 1968.

From 1964 to 1967, he was a test officer, branch chief, and division chief with the Electronics Test Division, U.S. Army Air Defense Board, Fort Bliss, Tex. He has received the LOM, BSM, AM and ARCOM

Maj George R. Robertson was a personnel management officer with the Office of Personnel Operations (OPO) in Washington, D.C., prior to assignment to the Combat Arms Branch.

He attended North Georgia College and Emory University, Ga., graduated from the USMA in 1958, and earned MS degrees in civil engineering and theoretical and applied mechanics from the University of Illinois in 1963 and 1964.

Maj Robertson was S–3, 4th Engineer Battalion, 4th Infantry Division, Vietnam (1967–68), following three years as an instructor and assistant professor at the USMA, and he was with the 39th Engineer Group, U.S. Army Europe (1959–62). He holds the BSM, and ARCOM w/2 OLC.

Lt Col Paul R. Curry was assigned to the Air Mobility Division, after serving as maintenance officer, 34th General Support Group, and executive officer, 765th Transportation Battalion, Vietnam.

He earlier served as senior Army officer, Tripartite Evaluation Squadron (P–1127) with station at RAF West Raynham, U.K., and at Fort Campbell, Ky., and was assigned as an aerospace engineer and research test pilot at the U.S. Army Aviation Material Laboratories, Fort Eustis, Va. (1961–65).

He has a BS degree in chemical engineering from Kansas State University (1950) and an MS degree in aerospace engineering from the University of Arizona (1968). He holds the LOM w/OLC, the AM w/OLC and the ARCOM.

Lt Col William C. Stephens graduated from the Army War College shortly before he became chief of the Communications Branch, Communications-Electronics Divsion. He has a BSEE degree (1951) from Georgia Institute of Technology, and an MS degree in electronics (1958) from the University of Florida. He graduated from the C&GSC (1963) and the Armed Forces Staff College in 1966.

He served as a staff officer with the Sentinel System Office, Alexandria, Va., in 1968 after serving in Vietnam as CO of the 39th Signal Battalion and as chief of the Communications Systems Division, HQ 1st Signal Brigade.

From 1963 to 1966, he was a signal officer with HQ U.S. European Command, Paris, France, and served with the U.S. Army Combat Surveillance Agency in Arlington, Va. (1958–62). He has been awarded the LOM, BSM, AM, JSCOM, and the ARCOM.

Lt Col E. D. Frankhouser is a staff officer with the Electronics Branch, Communications-Electronics Division, following a tour as CO of the 361st Signal Battalion and deputy chief, Communication Systems Engineering and Management Agency, 1st Signal Brigade, Vietnam.

He has a BS degree in physics from Carnegie Institute of Technology (1952) and an MS degree in nuclear engineering from the University of Arizona (1964). He completed the C&GSC in 1968 and served as an instructor at the USMA from 1964–67.

Aerodynamics Thesis Earns PhD for AARL Researcher

Robert A. Ormiston, a research scientist with the U.S. Army Aeronautical Research Laboratory (AARL), Moffett Field, Calif., received his doctor of philosophy degree Oct. 3 from Princeton University, Department of Aerospace and Mechanical Sciences.

Robert A. Ormiston

The thesis, "Theoretical and Experimental Aerodynamics of an Elastic Sailwing," presented under the guidance and support of his adviser, Prof. E. Seckel, represented one of the major phases of a long-range study of semiflexible wings by the Flight Mechanics Laboratory at Princeton. Dr. Ormiston previously attended Rensselaer Polytechnic Institute, Troy, N.Y.

Since joining the AARL staff Feb. 12, 1968, he has been involved primarily in studying rotary-wing aircraft. Projects on which he has worked have included jet flap rotor helicopters, experimental studies of tail rotor aerodynamics and, more recently, the dynamics and control of hingeless rotors.

He holds the LOM, BSM, and ARCOM w/OLC.

Maj Carl G. Herrmann was assigned to the Army Laboratories Branch, Southeast Asia Division, following a year as 2d Brigade signal officer, 1st Cavalry Division, Vietnam.

Graduated from the USMA in 1956, he did graduate work in electrical engineering at the University of Arizona (1959–60) and completed the C&GSC in 1968.

From 1964 to 1967, he was systems control officer and systems engineering officer, Defense Communications Agency, Europe, after three years service as project officer for the AN/GRC–106 radio set and assistant to the chief of the Technical Staff, U.S. Army Electronics Laboratory, Fort Monmouth, N.J.

He has been awarded the BSM, AM, JSCOM, and ARCOM w/OLC.

MISSILES & SPACE. *Lt Col Clifford Jones Jr.* served as assistant S–3 and S–3, 4th Infantry Division Artillery) in Vietnam before assignment to the Missile Defense Branch, Missile Defense, Ranges & Space Division, OCRD.

A 1955 graduate of the USMA, he earned an MS degree in mechanical engineering from the University of Southern California in 1964 and completed the C&GSC in 1968. He served as a senior intructor at the U.S. Army Air Defense School, Fort Bliss, Tex. (1965–1967), and battery commander and division artillery adjutant with the 7th Infantry Division in Korea (1964–65).

He holds the BSM, AM w/OLC, and the ARCOM.

Maj Morton P. Sherzer completed the C&GSC and served a tour of duty in Vietnam prior to assignment as a staff officer, Missile Defense Branch, Missile Defense, Ranges and Space Division.

From 1964–67 he served with the R&D Directorate and the Missile Intelligence Division, HQ U.S. Army Missile Command, Redstone Arsenal, Ala., following a 3-year tour of duty with USAREUR in Nancy, France.

Maj Sherzer has a BS degree in chemistry from Tulane University (1955) and has been awarded the LOM and BSM.

Maj Clifford C. McMullen became a staff officer, Range Branch, Missile Defense, Ranges & Space Division, following completion of the C&GSC.

He served in Vietnam as chief of the Terrain Section, Combined Intelligence Center (1967–68); company commander and S–3, 5th Engineer Battalion, Fort Leonard Wood, Mo. 1965–66); and training adviser MAAG, Vietnam (1963–64).

Maj McMullen earned a BS degree in civil engineering from the University of Alabama (1958) and an MS degree in civil engineering from the University of Missouri (1967). He holds the BSM w/OLC, ARCOM and Air Force Commendation Medal.

Lt Col Bill C. Giallourakis completed the C&GSC prior to assignment to the High Altitude Systems Branch, Missile Defense, Ranges & Space Division, OCRD.

Graduated from the USMA in 1958, he earned an MS degree in electrical engineering from Purdue University in 1964, then served as an assistant professor at the USMA until 1967.

He completed a tour of duty with the 1st Infantry Division (Artillery) in Vietnam before he attended the C&GSC. His honors include the LOM, BSM/w V device and OLC, AM w/ OLC, and the ARCOM w/OLC.

Maj Robert A. Flory completed a tour of duty in Vietnam before he was assigned to the Low Altitude Systems Branch, Air Defense and Missiles Division. Graduated from the USMA in 1956, he received an MS degree in nuclear physics from Tulane University in 1967, and completed the C&GSC in 1968. From 1963–65 he served with the 11th Air Assault Division at Fort Benning, Ga. He holds the AM and ARCOM.

ABMDA. *Lt Col John T. Fedko*, assigned to the Advanced Systems Studies Division following completion of the C&GSC, recently served tours as S–3, 35th Artillery Brigade, Fort Meade, Md., and S–3, 13th Artillery Group, Homestead AFB, Fla.

He was plans officer for the G–3 Section, 8th Army HQ in Korea (1965–66); Air Defense School representative for Nike-X at Bell Telephone Laboratories, Whippany, N.J. (1962–65), and project officer, Air Defense Combat Developments Agency, Fort Bliss, Tex. (1960–62).

Graduated from Muhlenberg College in 1951, he is studying for a degree in aerospace operations management from the Unversity of California. He holds the ARCOM w/OLC.

Lt Col James H. Sloan Jr. served with the Americal Division in Vietnam until he was assigned to the ABMDA Optical Systems Division.

Graduated from the USMA in 1954, he earned an MS degree in nuclear physics from the University of Oklahoma in 1963, and completed the C&GSC in 1968.

He served as physicist with the FC/DASA at the Lawrence Radiation Laboratory for three years, following a tour of duty with the 7th Infantry Division in Korea, and was at HQ U.S. Army Artillery & Missile Center, Fort Sill, Okla. (1960–61).

Col Sloan has been awarded the LOM, AM w/V device and 8 OLC, and the ARCOM w/OLC.

Maj Thorton S. Saferstein was inspector general, Americal Division, Chu Lai, Vietnam, prior to assignment as a systems analyst with the Advanced Systems Studies Division, ABMDA.

He graduated from the USMA in 1956, completed the C&GSC in 1968 and the GM Systems Officer Course at Fort Bliss, Tex., in 1964.

Recent assignments include Air Defense cannon project officer, U.S. Army Combat Developments Command Air Defense Agency, Fort Bliss, Tex., and Battery commander, 14th Armored Cavalry in Germany. He holds the BSM and ARCOM.

TILO. *Lt Col John A. Shanahan* is assigned to the Industrial Liaison Branch, Technical and Industrial Liaison Office.

Graduated recently from the C&GSC, he was information officer for the Saigon Support Command in Vietnam (1967–68), nuclear weapons employment instructor at Fort Sill, Okla. (1966–67) and battery commander, 3d Gun Battalion, 82d Artillery, and then S-3 of the 2d Battalion, 5th Artillery, USAREUR (1962–65).

He holds a BGE degree from the University of Omaha (1966). Among his military citations are the BSM, RVN Campaign Medal w/device, Vietnamese Service Medal, National Defense Service Medal and the ARCOM.

INTERNATIONAL OFFICE. *Col James E. Wirrick*, a "charter member" of the U.S. Army Research Office, who served as commanding officer of the U.S. Army Behavioral Science Research Laboratory (BESRL) since September 1968, has been assigned to the International Office of OCRD.

From 1957 to 1960, he served as assistant and then executive secretary of the Army Scientific Advisory Panel (ASAP) under the first two chiefs of R&D. He later served a 3-year tour as senior standardization officer with the Standardization Group in Australia.

BESRL. *Lt Col Leonard J. Greeley*, who had been serving since September 1968 as a staff officer in the Behavioral Sciences Division, USARO, succeeded Col Wirrick as CO of BESRL.

Major assignments include tours with the Advanced Infantry Training Brigade at Fort Lewis, Wash.; 8th Infantry Division, USAREUR; and with the 82d Airborne Division and 2d Battalion, 325th Infantry at Fort Bragg, N.C.

Lt Col Greeley is a 1953 graduate of the USMA and completed the C&GSC in 1968. He holds the CIB and Master Parachutist Badge.

Laird Details Technological Superiority Complexities

Secretary of Defense Melvin R. Laird discussed the problem of maintaining technological superiority over any potential enemy, as complicated by demands for research and development economies, in a recent address to the National Press Club. The major portion of his address follows:

* * *

. . . Today there is war weariness among the people and there are domestic sores that cry for healing. And there are unwise demands to apply a meat-ax to the Defense budget.

We are deeply concerned particularly about the slashes in research and development appropriations which have been voted by the Senate. The Soviet Union has pulled roughly even with us in the annual effort they are putting into defense-related research and development and through their much larger program of training scientists and engineers. If we lose technological superiority to the Soviet Union, it will have grave consequences for national security.

More than any other requirement of national security, we must guard against permitting superiority in defense technology to pass to the Soviet Union. We are keeping this consideration in mind as we continue our review of Defense programs.

When studies now in progress are completed, we hope to be able to deal with the problems of the Defense budget in a much more comprehensive, systematic and orderly way than has so far been possible.

Let me try now to put our basic problems into perspective by way of introduction into a more detailed discussion of what we are trying to do.

Size and Control of the Defense Community. The Department of Defense has some 3.5 million servicemen and 1.2 million civilians. That is more than twice as many people as are employed by a combination of General Motors, Ford, Chrysler, General Electric, Jersey Standard, IBM, and U.S. Steel. It is more than the combined total employment of the 30 largest companies. Its assets (about $200 billion) are greater than the combined assets of the 65 largest industrial companies. We annually engage in more than 200,000 individual procurement actions of $10,000 or more involving more than 100,000 prime and subcontractors across the nation.

Now, to give new direction to this mammoth organization, we were able to bring in something less than 100 new top officials. This new talent—the leaders of the Nixon Administration in the Defense area—were thrown into a going organization of almost 5 million people who operate with established, complicated and interrelated procedures. Even more important than procedures, the vast majority of these people had set attitudes.

I recite these facts and figures to point up an age-old problem: the infusion of a small number of people into a huge and complex organization cannot in a constructive way have immediate broad impact. Realistically, the basic changes needed cannot all be instituted or implemented in six months or a year. Recognizing this, what we are trying to do is lay some new fuses—often they have to be long fuses—in order to bring about meaningful and constructive changes in how decisions are made and carried out. We are trying to provide a leadership which encourages an attitude of cooperative progress by all within Defense toward building a strong national security posture.

This process—the setting in motion of forces and actions that will have a long-range impact on the Defense establishment—is the less visible side of Defense.

To get a handle on this vast establishment, we addressed ourselves to two basic questions:

1) How do we determine what our mission or our role is?

2) How best can we organize or reorganize to perform that role?

The first question—determining our mission—should not be the concern of the Defense Department alone. The Defense Department should not be expected to determine its own responsibility. Rather, it should tailor its forces and plan their use in accordance with objectives set by the President and the Congress and, ultimately, by the American people.

How much should be in the Defense budget and for what purposes are questions that can be answered only after decisions have been made, on the one hand, about the foreign policy interests of the United States which should be supported and defended by our armed forces and, on the other hand, about the resources which the U.S. economy can reasonably be expected to make available. Any rational approach to the Defense budget must begin with the establishment of both basic national security and economic policy.

Decision-Making and Management Procedures. The basic question to which we addressed ourselves—how to organize to perform the Defense mission—has been a major undertaking in its own right. Perhaps the most significant change since January affecting national defense has been the revitalization of the National Security Council. It is through the NSC process that we in Defense should get our marching orders.

Under the Nixon Administraton, the President intends to make the basic decisions about mission and role and objectives of the armed forces after receiving the recommendations of the National Security Council. I know you are all familiar with the charge that the so-called military-industrial complex has attained the upper hand, and missions, requirements, and production to fulfill these requirements are generated and perpetuated by this so-called complex.

Because the NSC machinery was not effectively used during the 1960s, I believe that the Defense community sometimes did seem to dominate in matters of foreign and military policy. Without a viable NSC structure to set the requirements and choose the options at the Presidential level, it is more difficult to counter such a charge.

The purpose of the new NSC process is to permit the President to make informed choices between strategies to be followed and force levels to be set. This makes far more sense than choosing your force levels first, because in the final analysis the force levels then govern both your strategy and your ability to fulfill commitments.

Revitalization of the NSC machinery also requires some basic adjustments in the organizational procedures within DoD. To make those changes, we decided there were four basic ingredients we could not do without: 1) clear and concise policy direction; 2) full participation in the decision-making process; 3) an open information policy; and 4) decentralized management with accountability.

Policy Direction. We are committed, both in principle and practice, to civilian control of the Pentagon. This

does not mean, however, that every decision must be concentrated in the Office of the Secretary of Defense. In an organization as vast and complex as the Defense Department, such a centralization would mean few decisions could be carefully weighed and many decisions would be postponed indefinitely, or go by default.

The basic policy decisions on such things as choice of weapons systems for development, force levels, distribution of forces between missions and parts of the world, and so on, must be made by the Secretary of Defense to insure consistent, effective and efficient implementation of national security policy set by the President.

Full Participation. Although such basic policy decisions must be finally made by the Secretary of Defense, I cannot properly make such decisions in a vacuum. For maximum effectiveness, all elements of defense organization must contribute both information and viewpoints to the process. Decision-making must be fully participatory.

To obtain full participation requires that we permit defense personnel, military and civilian, to express differing opinions freely, even from sometimes limited perspectives without the prospect of external second-guessing and criticism. Since assuming the Office of Secretary of Defense, I have encouraged the expression of differences of opinion within DoD and have always attempted to give a fair hearing to conflicting points of view.

We mean to preserve the principle of free discussion in the decision-making process within Defense by continuing our practices of generating working papers for internal use by the Secretary of Defense. I can only hope that the Congress will permit us to maintain that capability in order to insure that the Secretary of Defense has all the facts before him —the pros *and* the cons—before making his decision on major weapons systems.

We are moving toward a process by which the papers containing a limited viewpoint or preliminary analysis—working papers, that is—will culminate in a balanced paper containing a fair statement of all legitimate viewpoints and alternatives—on the basis of which a decision can be made. The basic content of this decision paper, unlike the working papers, could in the future be made available to concerned Congressional Committees under appropriate security classifications in response to their requests.

Open Information. Classification will be held to the minimum required by security, for we are also determined to maintain an open information policy so that the members of your profession and, through you, the American people can have the fullest possible understanding of the programs and the policies that are in effect within or proposed by the Department of Defense.

Decentralized Management. Once basic policy decisions have been made by the Secretary of Defense, decentralization will be the watchword. Management of the functions authorized by the policy decisions will be delegated down to appropriate levels in the Department, together with commensurate authority to do the job.

When mistakes are made in the management of some functions, I do not intend to rush in and become the manager myself. What Dave Packard and I will do, whenever indicated, is find a man who *can* do the job that is being mismanaged. This indicates a third element that will accompany delegation of management responsibility and authority—that element is accountability.

We believe this approach will lead to better decisions and greater efficiency. DoD is big and complex. No Secretary of Defense can do it alone.

The development of leadership is tied very closely to decentralization. By decentralizing, we hope to get the maximum use of the talent at all levels of DoD. The question comes down to who will be making the decisions one year, five years, ten years from now. You can't prepare or train a man to lead if you give him no chance to lead.

As with any course of action, there are pluses and minuses to decentralization. It will bring about more effective administration. But let me be candid. It could also lead to more errors of judgment down the line. There has been a tendency in the past for the Secretary of Defense to move immediately across levels of authority to get at a mistake when it became visible. I intend, as much as possible consistent with my ultimate responsibility as Secretary of Defense, to resist that tendency whether it involves a management mistake or a potential scandal.

When management responsibility and authority are placed in other hands, and accountability is enforced for decisions and actions taken, it is also necessary to permit your managers to seek their own solutions to problems that inevitably arise in a complex and far-flung enterprise.

The key word here is trust. When you pick a man and give him a big job, you have to be willing to let him do the job. As Secretary of Defense, I will set the broad policy and keep a strong evaluative capability, but I will expect my managers to come up with the specific tools and techniques to get the job done.

To insure a continuing availability of talented people, we have set in motion several things, including:

- The promulgation of a new basic statement on "human goals" which sets forth our manpower principles.
- The establishment of a Presidential Commission on the All-Volunteer Armed Force.
- The determination to make basic changes in the draft in order to drastically reduce its inequities.
- The launching of a basic review of our ROTC program; and
- The development of a new pay reform proposal which we will soon send to the Congress.

We have been taking major steps to get control of the weapons acquisition process in order to avoid large premiums for marginal performance gains, to minimize cost overruns, and to set in motion policies and programs that will bring about basic improvements in weapons acquisition and in the general management of the Department of Defense.

These steps have both a short-range and a long-range aspect. In the short run, we have instituted significant reforms to control these problems by more careful monitoring of the steps in the acquisition process. For example, we are requiring more realistic pricing and scheduling at the outset and then we mean to insist that the contractor remain within established ceilings or absorb any overrun that results.

For the longer run, we have the Fitzhugh Panel hard at work looking over every aspect of the organization and management of the Department of Defense. We expect major recommendations from that Blue Ribbon Panel that will lead to great improvements in the operation of the Defense Department in the future.

In summary, I would be the last to deny that the day-to-day battles of Defense management occupy a significant portion of our attention. We cannot afford, however, to let the short-range problems divert our attention from the longer-range and more basic reforms. As important as those current problems are, the less visible but more fundamental changes in management approaches we are instituting will be the true measure of our success or failure in operating the Defense Department. If successful, they will pay large dividends in security and in savings to the American people.

CRD Discusses Aircraft Requirements at Army-Industry Meet

Projected Army aircraft requirements for the 1970s were discussed by Army Chief of Research and Development Lt Gen Austin W. Betts in an address to the sixth annual meeting of the Army-Industry Aircraft Association, Oct. 20–24, Anaheim, Calif. General Betts' address follows:

* * *

Any appraisal of the Army aviation program, present or future, must begin with a recognition that Army aircraft, in large numbers, are here to stay. It is no longer a question of whether or not the Army should have organic aircraft, but rather, how many? Or, what types and how best do we complement the tremendous capability inherent in the high-performance, fixed-wing tactical air support we get from the Air Force?

We do not intend to try to preempt the role of the Air Force in tactical air support nor do we intend to give up any measure of the organic air mobility and aerial firepower that have proved to be effective in Vietnam.

Some of you will remember that not many years ago it was argued that we just could not afford to have large numbers of helicopters, or, if we did afford them, we could not maintain them under combat conditions. If we have learned nothing else from our experience in Vietnam, it is that we can't afford *not* to have large numbers of helicopters; furthermore, we have clearly proved that we can provide adequate maintenance to keep them flying, and that includes complex avionics.

One must recognize that the combat effectiveness of air mobility does not come simply from having aircraft available on call. It comes from the integration of the inherent mobility of aircraft in every key function of the combat division.

Missions of Army aircraft include medical evacuation, surveillance and target acquisition, troop movements with escort that can provide the suppressive fire that makes it possible to land troops safely in spite of enemy defenses, and deliveries of all types of combat support. Last, but not least, is mobile fire support either by air-lifted artillery or by the flexible firepower of helicopter gunships.

We must look at aircraft as more than just vehicles. We must look at them as subsystems that fill their proper role in that over-all weapon system we call the combat division.

Now, in that context, what does the Army's future aviation program look like? I propose to answer that question with brief discussions of the major aircraft systems the Army wants to develop, and point out some of the exploratory development work the Army intends to emphasize in the next few years.

The table below shows the predicted breakout of our inventory, by fixed- and rotary-wing, and by general-mission aircraft. Gunships are carried in the second category and include almost 700 Cobras and somewhere in the vicinity of 600 of the older UH1B or C gunships. This means gunships will be about 10 percent of our total.

Army Aircraft Family—1970

Observation/Surveillance/ & Utility-Fixed Wing	16%
Observation/Utility/Escort Rotary Wing	65%
Cargo	7%
Training	12%
Rotary 82%	
Fixed 18%	
	100%

Major aircraft systems the Army believes it should be developing in the next few years promise no surprises. We believe our current program represents a balanced family. The problem then is modernization. The major candidate systems begin with an advanced aerial fire-support system to supplement existing Cobra gunships. We look to the Cheyenne to fill that role.

Next, we will need a new utility tactical transport to replace our 10-year-old Hueys; then a heavy-lift helicopter to expand on the lift capability now available with CH54s. Before long, we will need a manned aerial surveillance vehicle to succeed the aging Mohawks. Finally, we must plan ahead to develop a replacement for the CH–47 Chinook as a light tactical transport aircraft.

I have not listed our future aircraft requirements in order of priority, but the list as given is not far from what I expect to be the priorities when things settle down. It could be that in the most extreme situation, as a result of Congressional actions and our own review findings, that perhaps another system or systems, such as intelligence or command and control aircraft, could enter the picture and change these priorities. Nevertheless, as of now, these are our prime development candidates.

As of today, we have a full development program under way on only one of these—the gunship requirement—the AH–56A Cheyenne program. As you know, the production contract was terminated, though the R&D contract continues. Lockheed now is trying to solve problems like rotor stability and control.

Incidentally, even though pointed to the Cheyenne, the work we are doing should have general application to all helicopter technology. It will, in any event, produce data for decisions concerning the future of armed helicopters.

Since the production contract cancellation caused a loss in planned armed "chopper" assets, as well as the loss of an improved gunship capability, we are evaluating alternative courses of action. One of these naturally is to upgrade the HueyCobra—to include such things as adding a night-vision capability, more firepower, and improving maintainability and mission availability. Just how much we can do along those lines will depend on how Congress responds to our request for funding.

The Senate Armed Services Committee deleted FY70 RDT&E funds for Cheyenne following cancellation of the production contract. It is possible that all or part of the RDT&E funds will be restored by the House and incorporated in the final FY70 Authorization Bill.

I believe there is general recognition that the Army has an urgent and valid need for an improved armed attack helicopter and that a cancellation of the present development program could prove more costly to the government in the long run and delay the early availability of this very important combat capability.

Another high-priority effort is the utility tactical helicopter (UTTAS). We have been studying this aircraft for some time, and our studies continue as we look at the funding likely to be available. We must look again at the total life cycle cost of a new system, as against product improvement of the existing Huey. A key variable, yet to be fixed, is the size of the squad. We must also fix on whether we want single or twin engines for such a high-density aircraft.

Right now, there seems to be no clear-cut agreement on either of the issues. The main point, on which everyone is in agreement, is that we must reduce maintenance requirements and raise mission availability.

As you may know, we have awarded two contracts, to Pratt and Whitney

and to General Electric Co., to build competitive versions of an engine that will incorporate advanced technology and result in reduced weight, better fuel consumption rate, reduced infrared engine radiation, and improved maintainability. We expect that this engine will be closely tied to the UTTAS design.

The third major system—one we also regard as high priority—is the heavy-lift helicopter that the Army began studying as early as 1956. In fact, we funded some exploratory development, mostly component work, and joined with Hughes in developing a research test bed aircraft, the XV9A, while watching closely Sikorsky's concurrent work with the S–64.

We are now thinking in terms of a future heavy-lift aircraft with a 20- to 30-ton lift capability. It has been our intent to begin a formal development program in FY70, but its status is uncertain.

The Senate Armed Services Committee has recommended a deletion of this program from the FY70 program. Again, it is possible that the House will restore at least part of the requested money or that it may be restored through joint House-Senate conference. If not, the program start will be delayed at least a year.

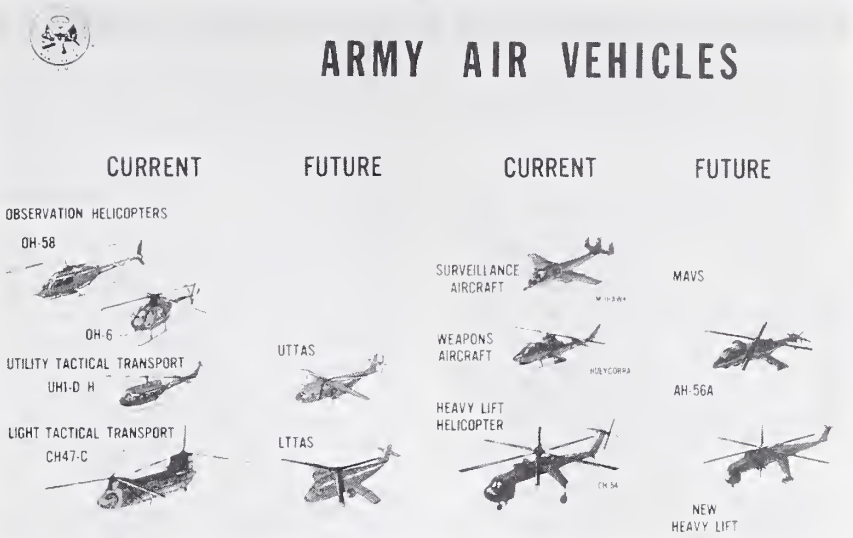
Two major aircraft systems the Army will need to address in some later development programs are replacements for the Mohawk and the Chinook. Limitation on funding dictates a period of at least four years for concept formulation on the Mohawk successor—the Manned Aerial Vehicle for Surveillance (MAVS)—starting early in FY70.

We plan to assemble a MAVS helicopter flying laboratory with which to experiment and flight test various breadboard sensor systems. Contract definition might then come in FY73, with engineering development to begin two years later. I believe I can safely say that for budgetary reasons even this relaxed schedule will stretch out. Actually, the question of whether or not we are ready to begin a formal concept effort this year is dependent upon findings of studies under way.

As for the Light Tactical Transport Aircraft System (LTTAS), the beginnings of this development are some years away, at least, since the CH47C model is only now entering the inventory. This latest modification represents a significant improvement in this medium cargo helicopter category.

Aside from the specific aircraft I have discussed, there are several broad categories of supporting programs that the Army considers essential, and that we plan to pursue—fire-safe fuel and/or crash-resistant fuel tanks; diagnostic equipment that will identify actual or potential trouble spots in the aircraft mechanisms; noise reduction; Tactical Aircraft Guidance System (TAGS); propulsion and transmission systems such as the stopped and stowed rotor; and infrared signature suppression. Concurrently, we intend to push our airborne-sensor and target-acquisition systems.

In summary, the Army feels that its current aircraft family is basically an aging one, from a technological point of view, and that it should be replaced in the next decade.



(See diagram, above, for current and future trends in Army Air Vehicles.)

Yet we recognize only too painfully that the climate of the future may well require further RDT&E budget austerity. As always, there is much more technology available to improve our air-mobile capability than we can possibly afford. The problem now is to spend our limited resources wisely. With your help, we will do just that.

ECOM Personnel Contribute to Success of GOMAC

U.S. Army Electronics Command personnel contributed substantially to the success of the recent Government Microcircuit Applications Conference (GOMAC) in Washington, D.C.

Konrad H. Fischer, chief, Integrated Circuits Branch, Electronic Components Laboratory, was chairman of the 37-member Technical Program Committee for GOMAC, comprised of Army, Navy, Air Force and National Aeronautics and Space Administration employes.

Robert A. Weck, secretary of the committee, was chairman of the "Microwave Microcircuit Applications" session. Dr. E. T. Hunter was chairman of a session on "Circuit Radiation Response" and George Hrivnak headed discussion of "Digital Systems."

A technical paper titled "Application of Integrated Circuits to the AN/APN–158 Airborne Weather Radar Set," presented by William F. Kiss, was coauthored with Vincent J. Organic and Randolph A. Reitmeyer Jr.

"Properties of Junction Field-Effect Resistors and Bipolar Transistors Codiffused in a Monolith" was coauthored by James S. Kesperis, O. Korolkoff and Sydney Marshall, with Marshall making the presentation.

All of the ECOM scientists and engineers who presided at sessions or coauthored papers are with the Integrated Electronics Division, Electronic Components Laboratory, headed by Dr. Eduard A. Gerber.

USALMC Creates RDT&E Unit Headed by Rachmel, Killebrew

Reorganization of the U.S. Army Logistics Management Center, Fort Lee, Va., recently resulted in establishment of a Department of Research, Development, Test and Evaluation headed by Leo Rachmel. Cmdr T. E. Killebrew, U.S. Navy Supply Corps, is dean of the School of Acquisition Management.

The RDT&E Department is responsible for conducting the R&D Management Orientation Course, and also the Army Test and Evaluation Course for the Army Materiel Command and such other Army commands as may have need to attend.

Chesarek Discusses R&D Problems Tied to Cutbacks

(Continued from page 2)

ity and the number we buy are determined by our technology and our assessment of future capabilities of potential enemies.

"Since secrecy usually hides much of the capability of the Soviet Union, we in fact rely heavily on technology to insure us against disastrous surprises. Our weapons must be at least as good as those of any potential enemy, and we must be well aware of technical advances that could make useless the weapons we depend on for deterrence and war.

"What this means is that we must have broad technological superiority over any potential enemy; not parity, superiority.

"We must have technological superiority in order to know more about what nature has to offer, to know about the kinds of things that another country could do and to move quickly and effectively if a new danger seems near. *Note that I am talking about research and development, not necessarily procurement of weapons.* (Italics added.) The president must have the option to buy. He often need not buy. Research and development give him the options—options without which he might be powerless to act.

"A decade ago the Soviet Union launched Sputnik. In secrecy they achieved technical superiority in a narrow area—large boosters. But we had over-all technological superiority, and we overcame their lead. We sent men to the Moon while the Soviets were surveying landing areas.

"But suppose it had not been a race in a peaceful use of space. Suppose we had been surprised by a Soviet technological advance in an area critical to our security. Suppose the Soviets had found some new and unexpected way to counter our deterrent weapons. We would have been forced to live a most precarious decade without a deterrent to the Soviets."

There is no application of the Rubber Russian Concept or of well-balanced inadequacy here. This is sober and responsible appraisal of our country's future defense posture. I subscribe fully to Dr. Foster's concern in the research and development area.

We in the Army have been under attack on a number of our systems now under development, mainly on the Main Battle Tank program. To us, this is a vital program, for we rely on quality to make up for the large quantitative advantage in armor enjoyed by the Soviet Union. Therefore, we have fought and will continue to fight hard to preserve this program. We will also strive harder to manage it better and make it more cost-effective.

A number of our past programs have also been criticized for cost overruns, unrealistic scheduling, changing objectives, and early obsolescence. To some degree, these are vital points, but the manner in which many have been presented to the people provides for a warped rather than balanced appraisal. Let me provide some rationale for this view.

In new weapon systems development, we are seeking to expand the state-of-the-art; to invent features to meet operational objectives. The hardware which flows from this development effort goes into inventory from 5 to 10 years after the program is initiated, depending on its complexity.

In some cases, we seek to invent a totally new concept, like the Redeye, a shoulder-fired, antiaircraft missile. In others, such as the Main Battle Tank, we had to invent a new power train, suspension system, stabilization system and automatic loader. The tank will fire an antitank missile, as well as new forms of conventional munitions.

Many things change during the course of the development cycle. We find that the operational objectives we strive to reach are not attainable; in other words, we fail in our efforts to invent something. In the process of trying, we extend our schedule and spend more money than programed. As often as not, new opportunities are created which were not foreseen, but which we should utilize. This costs time and money. The enemy threat changes, and we try to adjust to it.

In short, what is seldom if ever publicized is the fact that invention is an uncertain process, not conducive to rigid objectives and costs, and that major changes in scope are frequently introduced which render meaningless comparisons with original estimates. Another factor affect-

Picatinny, Frankford VE Ideas Save More Than $7 Million

Value Engineering ideas credited with saving an estimated cost reduction aggregating more than $7 million in FY 1969–70–71 were reported recently by the U.S. Army's Picatinny Arsenal, Dover, N.J., and Frankford Arsenal, Philadelphia, Pa.

Production economies totaling $5 million are claimed for redesign of the 750–pound bomb by four engineering personnel in the Ammunition Engineering Directorate at Picatinny Arsenal. This type of bomb is carried by F–4, F–105 and B–52 aircraft in Southeast Asian operations.

Production of the modified bomb is under way following field testing at the Supersonic Naval Ordnance Research Track, China Lake, Calif. Carl J. Beierle, project engineer for application of the VE idea, concedes that the redesign idea was not new but comments "it's the practical application that is significant."

Credited with contributing substantially to the concept of a one-piece forging to replace the inner ring and flange ring for the bomb's tail section are lab chiefs Phil Korman and Robert Mountford and supervisory engineer Richard E. Petrzak.

The Frankford Arsenal VE idea, reported to have yielded a unit cost reduction of $230.83 and FY 1969 savings of $466,302.69, FY 1970 savings of $670,756.59 and estimated FY 1971 savings of $922,259.52 (total $2,059,-318.80), was a redesign of the M53 sight unit. Redesign of the M128 telescope mount, a component of the sight unit, eliminated 14 parts in simplification of machining requirements, increased reliability and simplified maintenance operations.

Army Author Wins Acclaim For Dictionary of Computers

Standard Dictionary of Computers and Information Processing, a recent publication authored by Martin H. Weik Jr., chief, Data Management Division, Information Systems Office, Office of the Chief of R&D, HQ DA, has been receiving widespread acclaim as an authoritative work.

Nationwide distribution of the book by the Hayden Book Co. of New York (price $10.95) has elicited many favorable comments regarding its practical utility as a listing of more than 10,000 hardware and software terms and definitions in general use in computers and information processing.

The 336–page document represents more than 10 years of effort by the author in gathering, compiling, editing and updating the terms, including supplementary essays appended to the definitions. Cross references direct attention to other closely related concepts.

Announcements and reviews of the book termed it "an indispensable, practical reference for technical as well as nontechnical professionals."

ing comparisons is that we have never been permitted to apply an inflation factor in the budget process. This one fact of life alone will practically guarantee cost overruns.

The business end of the Army, which expends about $14 billion a year, is engaged in many activities other than research, development and production.

We operate a large complex of depots, arsenals, maintenance shops, and test ranges in support of the Army in the field. We delivered an average of seven million measurement tons of materiel to Vietnam during each of the past four years. The international sales and grant aid program is running at $1.015 billion annually.

In this logistical effort, we are pioneering in organizational innovations, automated tools, equipment control procedures to reduce costs and personnel, and are making slow but steady progress.

In the difficult period ahead, I can assure you gentlemen of our awareness of the need to reduce costs wherever possible; to conserve manpower, and seek improvements in performance.

We ask that the leaders of our country, such as you gentlemen, look objectively at our performance by calling for a balanced appraisal. I am certain that a healthy attitude of "Show me all" can change the destructive attitude of our times, because the "well done" part of our business is never reported upon. Good news is no news at all. Given all of the facts, we have no fear of losing the confidence of our fellow citizens.

According to the senior commanders in Vietnam, our forces there are better supported than at any time in our history. This is a part of any balanced appraisal, and a most important part, for as you are well aware, the business side of the Army exists for only one purpose: to serve our forces in the field by providing them the best equipment this country is capable of producing, in the quantities and at the time required.

In conclusion, I would be remiss if I did not mention the truly wonderful American soldier who has shouldered the burden of the war. Let me close my remarks with a quote from a letter recently received from an officer who has spent over three years in Vietnam as a senior combat commander.

"Today's young soldier is a splendid soldier. Independent, imaginative, critical, inquisitive, self-sacrificing, mature, and brave—that's him.

"But when one considers him in the context of our times, he is even more marvelous! He is fighting a tough and cunning enemy whom he must come to appreciate and master, almost at arm's length. He is fighting in a quite unpleasant environment foreign to his experience of relative comfort and sophistication. He is placing his life in the hands of junior combat leaders not much more experienced and certainly little older than he. He is participating in a war that is probably neither supported nor understood by his loved ones. He is willing to lay his life on the line for an eventual outcome that is quite unclear to him and, apparently, to many of his political leaders.

"But this quick-grown teenage *man* is a professional in every respect. He 'humps it' in the jungle for months on end without anything more serious than a soldierly gripe. He defends 'his wire' under intensive human wave attacks made by little people he neither understands nor hates. He calmly drinks his warm coke, flips his cigarette butt, and hops on the floor of a chopper to fly off to some stinking hole in a jungle called an LZ to face whatever challenge awaits him there.

"He is a professional soldier, and he is a strong American citizen. Somehow he senses that what he is doing is right and worthwhile. No matter what the outcome of this war for us, we can all be proud of him and thankful for his strength and faith in our future."

Graduate Study Program Helps 11 at MERDC

Under the U.S. Army's advanced education program to upgrade capabilities of career personnel, 11 employes of the Mobility Equipment Research and Development Center (MERDC), Fort Belvoir, Va., received recent approval for scientific, engineering or managerial training.

Full-time education at Army expense will be given to Donald B. Dinger, Edward J. Dowgiallo, Kenneth E. Hasle, Eric R. Jackson, Donald P. Kelley, Hamilton B. Reese Jr., Richard T. Sale, Joseph S. Shea, Wayne E. Studebaker, Robert A. Williams, and John E. Jones Jr.

The Army will pay the full cost of their training and education including tuition, books and incidental fees. At the same time, they will receive their salaries as employes of the MERDC.

An employe receiving long-term training at Army expense must make a commitment to work for the Army or the Department of Defense for a period equivalent to three times the training period.

Dinger, chief of the Electromagnetic Effects Laboratory, is studying for an MS degree in operations research at George Washington University.

Dowgiallo, an electrical engineering technician in the Energy Conversion Research Division, and Reese, a senior project engineer in the Mechanical Equipment Division, are seeking master's degrees in engineering administration.

Studebaker, a general engineer in the Fuels Handling Equipment Division, is working for a master's degree in engineering management. Jackson, employed in the Mechanical Engineering Division, is attending the University of Virginia for an MME.

Jones, a chemical engineer in the Sanitary Sciences Division, will enroll at the University of Glasgow (Scotland), where he will enter the graduate training program in desalination technology leading to a master of engineering degree.

Sale, a senior project engineer in the Power Equipment Division, will study at the University of Colorado for an MS in management science.

AMONG 11 MERDC EMPLOYES selected for full-time training under the Army's advanced education program are Donald B. Dinger, being congratulated by Col Russell J. Lamp, MERDC commander, and (from left) Joseph S. Shea, John E. Jones Jr., Eric R. Jackson and Hamilton B. Reese Jr.

Research Balloon Reaches Record Height at WSMR

Launching of a gigantic balloon, measuring with its payload twice the length of a football field, from White Sands (N. Mex.) Missile Range Sept. 23 achieved its experimental objective of collecting meteorological information at an altitude of 160,000 feet (about 30 miles).

The balloon was a redesigned version of one about the same size that was launched from White Sands in September 1968, also under sponsorship of the Atmospheric Sciences Laboratory (ASL), Army Electronics Command.

The first balloon attained a record altitude of 158,000 feet and remained aloft about 18 hours. The 1969 balloon attained a maximum height of 165,000 feet and ranged as low as 160,000.

Both experiments shared the purpose of measuring continuously over an 18–hour period the atmospheric temperature, pressure, density, ozone concentration and cosmic radiation at the stratopause, an atmospheric layer beginning 30 miles above sea level.

Collection of such knowledge is required for missile reentry studies and a number of other White Sands missile projects. The huge balloons, launched at a cost of about $35,000 each, provide a relatively low-cost method of stabilizing a platform to take continuous atmospheric measurements at high altitudes.

The balloon used in this year's experiment was onion-shaped—440 feet in diameter with a 297–foot tail. Its volume was 30.3 million cubic feet as compared with the 28.7–million-cubic-foot balloon launched in 1968.

To assure that scientific measurements in the 1969 experiment would be made in an environment undisturbed by the presence of the balloon, the payload was lowered by radio command 1,000 feet below the balloon by an electric reel when float altitude was reached.

Radio command was used to separate the payload from the balloon for lowering to the ground by parachute at the end of the experiment. Scheduled for a 24–hour flight, it was brought down before sundown to aid recovery of the instrument package. Recovery was accomplished within one hour at a site 100 miles from the launching.

Instruments used to collect meteorological information included two gauges to measure atmospheric pressure, two to determine ozone concentration, one to measure atmospheric density, one to measure cosmic radiation background, an accelerometer to record the balloon's vertical motion, and a sensor to measure balloon skin temperature.

Designed by the Air Force Cambridge Research Laboratories (AFCRL) R&D Balloon Branch at Holloman AFB, N. Mex., the balloon was launched by AFCRL personnel. It was manufactured by Winzen Research, Inc., Minneapolis, Minn. The University of Texas Schelling Research Laboratory provided the instrument package for the ASL.

ASL project scientists for the flight were Norman J. Beyers, Harold N. Ballard and Bruce T. Miers.

Presidential Order Defers 45 CE Civil Projects in 27 States

President Richard Nixon's call for a 75 percent reduction in new construction contract obligations, to curb inflation, has deferred 45 civil works projects of the U.S. Army Corps of Engineers in 27 states.

Exempted from the reduction were projects producing electric power that will deliver power on the line by Jan. 1, 1973. In essence, the only corps of Engineers civil works projects for which contracts will be awarded during the fall and winter are those required in connection with contracts already under way, or to prevent damage to work in place.

"New starts" included in the President's Budget for FY 1970 also will be deferred, the Corps of Engineers said. The Corp's total civil works program normally ranges well above $1 billion annually.

Transistor: Where, How Did It Start?

ECOM Electronics Pioneer Offers Documentary Proof

Transistor is today a word known throughout the world as the heart of millions of radios, computers, the modern communications industry, and hundreds of electronic devices. But when and where did it start?

That was the question that came recently to Dr. Ivan R. Hershner Jr., chief of the Physical and Engineering Sciences Division, Army Research Office, Office of the Chief of Research and Development.

Before it was necessary to investigate thoroughly the transistor's origin to provide an authoritative answer, Dr. Hershner was fortunate enough to encounter Dr. Harold Zahl, now a consultant to the director, Institute for Exploratory Research, HQ U.S. Army Electronics Command.

Currently adding to his professional reputation as the author of *Electrons Away*, a book that gives a typically humorous account of his 35–year career as an Army scientist at Fort Monmouth, N.J., Dr. Zahl had been director of research for 18 years when he retired in 1966 for reasons of ill health.

Few men have been more closely associated with the development of the electronics industry than Dr. Zahl. He readily came up with the answer to Dr. Hershner's question in the form of memorandum for: Commanding Officer, Signal Corps Electronics Laboratories, subject: Bell Telphone Laboratory Announcement of Transistor. The document states.

"On June 23, 1948, at the invitation of Dr. O. E. Buckley, President of the Bell Telephone Laboratories, Col E. R. Petzing and the undersigned visited 463 West Street relative to a disclosure of a new device which they called a transistor. Included in the invited party were also representatives of the other elements of the National Military Establishment."

The remainder of the memorandum is devoted to a detailed description of the elements of the transistor, carefully diagramed, and its amplification capabilities. Subsequently, Dr. Zahl states, "the Signal Corps spent many millions of dollars in pushing forward the mass production of the transistor and developing multiples sources—simultaneously, of course, lowering the price for all buyers. . . . "

ARMY MATERIEL COMMAND Deputy for Laboratories Dr. Robert B. Dillaway recently made his first visit to Watervliet (N.Y.) where he was briefed on the arsenal's R&D projects. Escorting him on a tour of the facilities were Maj T. Brown Jr. (left), chief of the Benet Research & Engineering Laboratories, and Col William Mulheron Jr., Watervliet Arsenal CO.

USACSC Adds 2 Multicommand ADP Systems to Mission

HQ United States Army Computer Systems Command (USACSC), Fort Belvoir, Va., has gained two multicommand automatic data processing (ADP) systems.

They are the Personnel Management and Accounting Card Processing System (PERMACAPS) and the Continental Army and Major Overseas Command System (Active Army Personnel Reporting System) (CARMOCS(A).

Brig Gen Wilson R. Reed, CG of the USACSC, has assumed responsibility for continued development, fielding and maintenance of the system, formerly held by the U.S. Army Data Support Command.

Principal functions of the PERMACAPS system are to provide personnel management and accounting data and information responsively and accurately; also, to link any Army division or Personnel Services company with the Army Personnel Reporting Systems at Army Data Processing Activities and Department of the Army level.

Prime users of PERMACAPS are the Administrative Machine Branch of the Personnel Services Division and, through this activity, the Army Division; also, the Administrative Machine Branch Division of the Army Personnel Company, and through this activity, nondivisional Army units.

There are currently 37 PERMACAPS installations Army-wide, with 17 additional installations planned by the end of December 1970.

The CARMOCS(A) system maintains personnel master files of all military personnel assigned to the geographical areas of each of eight Army Data Processing Activities: the five Army areas within the United States, as well as U.S. Army Pacific, U.S. Army Vietnam, and U.S. Army Europe.

Benefits resulting from the implementation of the CARMOCS(A) are timeliness, accuracy of data, management control based on planning, standard system and strict reassignment controls, reduction of workloads at Army data processing activities level, less key punching and system-wide compatibility.

Other major projects for which the U.S. Army Computer Systems Command is responsible include: Tactical Fire Direction System (TACFIRE), Tactical Operations System (TOS), Combat Service Support System (CS3), Quick Reaction Inventory Control Center (QRICC), Division Logistics System (DLOGS), Direct Support Unit/General Support Unit Computer System (DSU/GSU), CONARC Class One Automated System (COCOAS), Centralization of Supply Management and Operations, COSMOS), and U.S. Army Pacific Standard Supply System (3S).

Researcher Thanks R&D Chief For Aid on Unsponsored Work

Appreciation for Army assistance to a nonmilitary researcher was expressed in a recent letter to Chief of Research and Development Lt Gen Austin W. Betts from a Georgetown University professor of pharmacology.

Dr. Gertrude D. Maengwyn-Davis expressed "my sincere gratitude for the great help which was extended to me by the authorities at Fort Detrick and Dr Edward Schantz. . . . I am certain that advances in science are often made only by similar cooperation.

"May I further stress that my work was not sponsored by any of the U.S. Military Services. The research could not have been performed without the invaluable assistance of Fort Detrick. I am certain that help by the armed services is appreciated and needed throughout the scientific community."

Dr. Maengwyn-Davis has been investigating whether or not Botulinum toxin Type A would affect the sympathetic autonomic nervous system in a manner "similar to that previously demonstrated for Type D toxin by Westwood and Whaler (Brit. J. Pharmac. 33:21–31, 1968)."

Fort Detrick authorities provided toxoid for immunization and purified toxin for her research project.

Direct Dialing System Nears Completion in SEA

Installation of the communications system that will link areas that make up the Southeast Asia theater of operations by "Direct Distance Dialing" is slated for completion this year.

Known as the Southeast Asia-Automatic Telephone System (SEA–ATS), it is designed to provide Free World Forces in the area with the most modern and rapid common-user telephone services possible in a theater of combat operations.

Brig Gen Thomas Matthew Rienzi, CG of the U.S. Army Strategic Communications Command (STRATCOM) 1st Signal Brigade in the Republic of Vietnam and Thailand, calls it a "weapon system." Direct distance dialing in SEA began in November 1968 when the first of nine long distance (tandem) switching centers became operational at Bang Pla, Thailand.

A network of cable, tropospheric scatter and line-of-sight microwave radio systems whose circuits are capable of being extended via satellite and various other means, SEA-ATS has been hailed as the first 4–wire attempt in a combat zone—"equivalent to setting up communications in an area about four times the size of California."

Under the new system a telephone subscriber with access to SEA-ATS can direct dial to almost any location in the SEA area without encountering more than two automatic tandem switches. Prior to activation of the system, a subscriber might go through from six to eight manual switchboard operators on a long distance call between Vietnam and Thailand.

The tandem switching center system was implemented by the Joint Cutover Integrated Working Group (JCIWG), chaired by STRATCOM and composed of personnel from all military services in conjunction with the Defense Communication Agency.

Weapons Command Mathematician Listed in 1969 Women's Who's Who

Who's Who of American Women for 1969, published recently, lists Mrs. Catherine Robinder, a mathematician for 24 years with the U.S. Army Weapons Command (WECOM) and its predecessors at Rock Island, Ill.

Assigned to the Science and Technology Laboratory, Research and Engineering Directorate, Mrs. Robinder has received numerous honors attesting to her significant contributions to the solutions of problems in weapons mechanics.

In June, 1969, she served as chairman of a technical session of the Conference of Army Mathematicians, and is recognized among leaders in her specialty field as the author of more than 40 technical reports.

Mrs. Robinder has a bachelor's degree in mathematics and an MS degree in mechanics. Her undergraduate study at Augustana College, Rock Island, and graduate study at the University of Iowa was performed by attending night and Saturday classes while working full time.

Catherine Robinder

AOA Meet Features Fuzing Design, Application

Technological problems and advances in fuzing design and application were reported Oct. 1–16 at the American Ordnance Association's fuze section annual meeting at HQ Army Munitions Command, Picatinny Arsenal, Dover, N. J.

Stanley M. Smolensky, special assistant to the assistant administrator for policy, National Aeronautics and Space Administration, gave a featured talk on the Apollo Program.

Six Picatinny employes were among those who presented technical papers, namely: A. G. Edwards, Application of Hybrid Simulation Techniques to Fuze Design and Investigation; Jack Carlock, Human Performance Capabilities in the Remote Setting of Rocket Fuzing; Jerry Lyon, A Dynamic Digital Technique for Obtaining Accurate and Extremely Long Time Delays; Alexander Janushevich, Air Burst Fuzing for Flat Trajectory Weapons; Herbert I. Lewis, XM–619 Fuze for the XM66 Anti-Tank Mine; and G. R. Eskelund, Fluid Timer.

Three employes from the Harry Diamond Fuze Laboratories, Washington, D.C., reported on their research, as follows: Louis M. Tozzi, Small Projectile Fuzing; Quentin C. Kaiser, Microelectronics in Fuzing; Carl Campagnuolo, Fluidics in Fuzing.

Frankford Arsenal presentations were given by Robert Shaffer, Electro-mechanical Escapement System for Artillery Fuze Application, and John P. Hunt, Gearless Delay Arming Device.

Matthew E. Anderson, Naval Weapons Center (NWC), Corona, Calif., spoke on Semi-active Optical Bomblet Proximity Fuze, James R. Wills (NWC) on An Active Optical Air Burst Proximity Fuze.

Robert E. Elby, Naval Ordnance Laboratory, White Oak, Md., reported on Fuzing Techniques for Navy Conventional Weapons in the 1970s. Dr. Charles H. Brenner, Motorola, Inc., discussed Active Optical Fuzing Techniques, and Richard T. Ziemba, General Electric Co., presented Controlled Range Air Burst Fuze (CRAB).

Stuart Giles, Gould Ionics, Inc., spoke on Failure Mode Testing of Solid Electrolyte Electrochemical Timers; Vincent W. Martin, Hamilton Watch Co., An Integrated Circuit Electronic Timer; and James W. Abels, General Motors Corp., Bomb Mounted Integrated Circuit Telemetry System for Real Time Data Acquisition & Transmission of Munition Motion During Freefall.

Lt Col R. C. Smith, HQ U.S. Air Force, talked on Fuzing for Air Force Conventional Weapons in the 1970s, and LeRoy S. Stables, Eglin Air Force Base, Fla., discussed Optical Fuzing for Cluster Munitions.

Maj Gen Frank G. White, CG of the U.S. Army Munitions Command, and Col W. A. Walker, Picatinny commander, welcomed the group.

Col Hayes Assigned to OTSG As Executive to Comptroller

Col William H. Hayes, MSC, is the new executive officer to the comptroller, Army Surgeon General's Office, where he succeeds Manley G. Morrison, promoted to brigadier general and reassigned as chief of the Medical Service Corps.

Col Hayes served in Washington in 1961 as chief of Contracts Branch, Office for Dependents' Medical Care and moved to Denver, Colo., with this office (now called Office for the Civilian Health and Medical Program of the Uniformed Services) in August 1963. He was director of operations and management and contracting officer until last month.

Col Hayes has a bachelor's degree in business administration from the University of Hawaii, a master's degree from the University of Pittsburgh, and is a graduate of the Hospital Administration course at the Medical Field Service School.

Wooly 'Draftees' Assist in Shock Studies at LAIR

Sheepherding is not listed as a Military Occupational Specialty (MOS) but, in the cause of medical research, soldiers are helping tend a flock of sheep at the Presidio of San Francisco on a 3–acre tract near the Army Letterman General Hospital.

Letterman Army Institute of Research (LAIR) is interested in acquiring information that, hopefully, may help to save thousands of lives.

Commander/Director Col William A. Akers of LAIR and staff members are investigating to discover the causes, effects and possible antidotes for shock—a project that could have both military and civilian benefits. More people die from shock, such as might be sustained in an automobile or other accident, than from actual injury or wounds.

Maj Robert A. Fink, a physician and member of the research team, said LAIR is "trying to find a quicker way to treat casualties from Vietnam, as well as civilian accident cases."

Sheep have been chosen as participants in these experiments mainly because they have been shown to be cardio-vascularly similar to humans.

"They are more susceptible to this type of research than other animals," said veterinarian Capt Donald T. Bishop, "and they are docile animals, therefore more compliant with the testing they are undergoing."

The 120 wooly patrons of LAIR are well cared for at a former coastal artillery battery site which once defended the Golden Gate entrance to San Francisco Bay. S/Sgt Theodore Roosevelt Slone, NCO-in-charge, describes their area as a "million dollar home," since it is one of the most scenic spots at the Presidio.

All possible comfort accommodations are bestowed on the animals and their food inclues such sheep delicacies as ice plant and omolene. Researchers have even devised a new stretcher that eliminates discomfort while the sheep are being sheared. It's called a "ewe haul!"

LAIR's research programs range from dermatology to dentistry, dealing with problems primarily military but also important in the civilian community.

Boyd Directs Nuclear Engineering at Picatinny Arsenal

Col Russell R. Boyd is the new director of Picatinny Arsenal's Nuclear Engineering Directorate (NED). He succeeds Lt Col James N. Payne, now with the Deputy Chief of Staff for Logistics in the Pentagon.

Col Boyd, a 1946 graduate of the U.S. Military Academy, has a master's degree in electrical engineering from the University of Pennsylvania and is a graduate of the Command and General Staff College, Fort Leavenworth, Kans.; Ordnance School, Aberdeen Proving Ground, Md.; and Infantry School, Fort Benning, Ga.

Until recently he was group commander, HQ U.S. Army Advanced Weapons Support Command, Europe. In recent years he has served in Korea, at Sandia Base, N. Mex., Redstone Arsenal, Ala., Fort Bliss, Tex., and Washington, D.C.

Col Russell R. Boyd

MORS Slates Program for 24th R&D Planning Meet

Army, Navy, Air Force and industrial leaders are programed as speakers at the 24th Military Operations Research Society (MORS) Research and Development Planning Meeting, Nov. 18–20, at the U.S. Naval Training Center, San Diego, Calif.

Theodore S. Trybul, Advanced Materiel Concepts Agency, U.S. Army Materiel Command, is chairman of the meeting, focused on "The Contribution of Operations Research to Measures of Military Worth." Discussion will cover technological forecasting, creative R&D, research allocation, assessment of R&D resources, "coupling," and management techniques.

The program calls for the following presentations: "An Overview of R&D Management Techniques," George Ball, director, Engineering Management Office, Director of Defense Research and Engineering; "Weapon System R&D Planning for the 1980s," Dr. Harold A. Livins, director, Development Planning and Systems Analysis, Lockheed Corp.; and

"Some Problems and Answers in Coupling of R&D," Harold F. Davidson, Office, Chief of Research and Development (OCRD), HQ DA; "Integrated R&D Planning," Mike Fossier, vice president and general manager, Raytheon Co.; "New Concepts in Exploratory R&D," Col Frank L. Taylor, chief, Management and Evaluation Division, OCRD, HQ DA; and

"Elements of a Quantitative Long-Range Planning System," L. F. Eliel, manager, Systems Analysis, McDonnel/Douglas Corp.; "The Interface Between System Development and R&D," Dr. C. D. Fawcett, Directorate of Advanced System Concepts, U.S. Air Force; "Preparation of the Army Research Plan," James W. Sterling, Research Plans Office, OCRD, HQ DA; and

"Operations Research and Management in Army Studies and Analyses," Col George C. Muir, chief, Studies and Analyses Division, OCRD, HQ DA; "Precision of Delphi Methods," Maj Joe Martino, Office of Aerospace Research, U.S. Air Force; "Forward Planning—A Pragmatic Approach," James Langston manager, Long-Range Planning, General Dynamics Corp.; and

"Air Force Technological Barriers Documentation Project: Progress and Policy Implications," Alexander G. Hoshovsky, chief, Information Studies Division, U.S. Air Force; and "Naval R&D Planning Philosophy," Dr. N. Herbaugh, deputy commander, Planning and Policy, U.S. Naval Supply Systems Command.

Airborne Antenna Test Facility Nears Completion at Huachuca

Nearing completion for the U.S. Army Electronic Proving Ground (USAEPG) at Fort Huachuca, Ariz., is the 114-foot-high $200,000 Airborne Antenna Test Facility.

Composed of two parts, a 120–foot sensor-bearing arc and a rotating 20 by 22-foot platform, the nometallic facility is designed to measure the radiation pattern of aircraft antennas —without flying the aircraft.

In operation, an aircraft is placed on the platform beneath the arc with the antenna under test pointing up. The platform is then rotated and readings taken at a specified number of degrees by sensors mounted on the arc. A full-sphere antenna pattern analysis may be obtained by inverting the aircraft and repeating the process.

Measurement of the radiation pattern of aircraft antennas will be cheaper and more accurate than with the present system of measuring the antenna pattern while the aircraft is in flight. The new facility will eliminate the need to correlate aircraft position data with ground sensor data.

Federal Republic of Germany R&D Group Visits CDCEC

Ten members of the Federal Republic of Germany Cooperative Research and Developments "Steering Committee" recently visited the Army Combat Developments Command Experimentation Command at Fort Ord, Calif.

The group was briefed on new weapons and research and developments pertaining to warfare techniques and tactics of the future.

Ministerialdirektor Albert Wahl, Head Division T, Ministry of Defense at Bonn, led the group. Others from Bonn included Maj Gen Bernd Freytag Von Loringhoven, chief of staff, Armed Forces II; Ministerialdirigent Dr. Fritz-Rudolf Toepffer-Guentsch, Head Division T II; Brig Gen Hans-Ludwig Eberhard, Head Division T III; and

Ministerialdirigents Dr. Fritz Englemann, Head Division T IV, Dr. Herbert Gaertner, Head Division T VI, and Gunter Schoener, Head Division T VII; Ministerfalrat Dr. Joseph Jennissen and Col Paul Monreal, Head Armed Forces Division IX 5; and Regierrungsdirektor Dr. Heinz Damm, Defense Research Attache, German Embassy, Washington, D.C.

Many top ranking officers of the United States Armed Forces joined them in conferences at CDCEC Headquarters and in touring the command's field laboratory on Hunter Liggett Military Reservation.

Among them were Maj Gen Otto G. Glasser, U.S. Air Force; Rear Adm William N. Leonard, U.S. Navy; Maj Gen Fillmore K. Mearns, Military Assistance Advisory Group at Bonn; Brig Gen Kenneth F. Dawalt, Office, Chief of R&D, HQ DA and Walter Hollis, CDCEC scientific adviser.

CDCECs Commander Col Boyd L. Branson hosted the group.

MERDC Announces Publication Of 1969-70 Speakers Bureau

Publication of its 1969–70 Speakers Bureau has been announced by the Information Office at the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.

The Speakers Bureau lists engineers and scientists not only of the center but also at the U.S. Army Engineer Topographic Laboratories (USAETL) and the U.S. Army Engineer Reactors Group (USAERG) who are available as speakers for school science clubs, civic organizations, etc.

Subjects include water purification, fuel cells, electric vehicles, nuclear power sets, geography in the space age, aerial color photography, modern aerial surveying and mapping, electrical power, etc.

SCIENTIFIC CALENDAR

Strategic Offensive/Defensive Missile Systems Meeting, sponsored by AIAA, Monterey, Calif., Dec 1-3.

Vehicular Technology Conference Columbus, Ohio, Dec. 4-5.

Winter Meeting of the American Society for Testing and Materials, Cincinnati, Ohio, Dec. 7-12.

Symposium on Consumer Electronics, sponsored by IEEE, Chicago, Ill., Dec 8-9.

25th Annual National Electronics Conference and Exhibition, sponsored by IEEE, Illinois Institute of Technology, Northwestern University and University of Illinois, Chicago, Ill., Dec. 8-10.

Conference on Applications of Simulation, sponsored by IEEE, Los Angeles, Calif., Dec. 8-10.

International Symposium on Circuit Theory, sponsored by IEEE, San Francisco, Calif., Dec. 8-10.

International Symposium and Fall Meeting, sponsored by IEEE, Austin, Tex., Dec. 8-12.

5th Annual Aviation Maintenance Symposium, sponsored by FAA Oklahoma City, Okla., Dec. 9-11.

Symposium on Application of Magnetism in Bioengineering, Rehovot, Israel, Dec. 9-11.

2nd Annual Fluidics Show and Conference, Cleveland, Ohio, Dec. 10-12.

Asilomar Conference on Circuits and Systems, sponsored by IEEE, Santa Clara University and Stanford University, Pacific Grove, Calif., Dec. 10-12.

1969 Conference on Reliability in Electronics, sponsored by IEEE, Institute of Physics and the Physical Society (U.K. and Republic of Ireland Section), London, England, Dec. 10-12.

Conference on Holography and the Computer, Houston, Tex., Dec. 11–12.

Fall Meeting of the American Geophysical Union, San Francisco, Calif. Dec. 15-18.

Air Force Conference on Fatigue and Fracture of Aircraft Structures and Materials, Miami Beach, Fla. Dec. 15-18.

Kudos

MEDAL OF HONOR. President Nixon presented the nation's highest military award to *Maj Patrick Henry Brady* Oct.9 for courage above and beyond the call of duty. On Jan. 6, 1968, he flew his unarmed "Medevac" helicopter into "fog-blackened, enemy-infested areas" to rescue 51 wounded American and South Vietnamese soldiers.

Maj Brady is the first Medical Service Corps officer in history to receive the Medal of Honor, and the first Army Medical Department officer to win the award for heroism in Vietnam. Currently stationed at Brooke Army Medical Center, Fort Sam Houston, Tex., he is an instructor at the Medical Field Service School.

MERITORIOUS SERVICE. Three veteran Army Missile Command (MICOM) civilians were lauded recently for outstanding contributions to Army programs and given Meritorious Civilian Service Awards.

Maj Gen Charles W. Eifler, MICOM CG, made the presentations to *Luther F. Adams, David G. Harris* and *Paul K. Schaeppi.*

As MICOM deputy civilian personnel officer, Adams was praised for "his many outstanding contributions to the operation of a highly efficient, comprehensive civilian personnel program."

Foremost among his achievements was the direction of the operational aspects of the Command's Equal Employment Opportunity Program. He also was cited for leadership in increasing applications of automatic data processing to civilian personnel records.

Harris received the MCSA for outstanding direction of MICOM's public relations program over the past nine years, including his determined efforts in supporting plans for the Alabama Space and Rocket Center that will open early next year. He also was cited for advancing the work of the Huntsville-Army Advisory Committee, and service to the Tennessee Valley Chapter of the Association of the U.S. Army.

As the top civilian executive of the Missile Command's industrial program, Schaeppi was recognized for his astute direction of an effective work force in procurement and production activities. He "contributed immeasurably to the support of research and development, logistic, and training missions of the Command by assuring procurement of programed services and equipment essential to their accomplishment."

LEGION OF MERIT. *Col James O. Darling,* the executive officer of the Army's famed burn treatment center, the Institute of Surgical Research at Brooke Army Medical Center, Fort Sam Houton, Tex., received the LOM prior to retirement after more than 28 years active duty. He was cited for exceptional service with the research unit since June 1967.

Col Robert W. McEvoy received the LOM for exceptionally meritorious service as CO of the U.S. Army Limited War Laboratory from June 1965 to July 1969. He recently was assigned as doctrine officer, Army Ordnance Center and School, Aberdeen (Md.) Proving Ground.

Lt Col Guy E. Jester, now with the Plans Division, Office of the Chief of Research and Development (OCRD), received the LOM for exceptionally meritorious service as engineer, 9th Infantry Division, and concurrently as CO of the 15th Engineer Battalion, 9th Infantry Division, in the Republic of Vietnam.

Lt Col John F. Wall was awarded the LOM for service as CO, 20th Combat Engineer Battalion, 937th Engineer Group, 18th Engineer Brigade in Vietnam, October 1968 to June 1969. He is assigned to the Management and Evaluation Division, OCRD.

Lt Col William L. Rehm, since July the project manager for the Redeye missile at Redstone (Ala.) Arsenal, received the LOM for his preceding duty as operations training officer with HQ U.S. Continental Army Command. Brig Gen George H. McBride, acting commander, U.S. Army Missile Command, made the presentation.

DISTINGUISHED FLYING CROSS. *Maj Colbert L. Dilday* was awarded the DFC for heroism, Aug. 5, 1967, while participating in an aerial flight to rescue a downed F–11 crewmember in a dense mangrove swamp, with hostile troops around.

At the time, he was serving as aircraft commander of a UH–1D near Cat Lai Army Camp, Republic of Vietnam. Maj Dilday is a staff officer in the Communications-Electronics Division, OCRD.

BRONZE STAR MEDAL. *Lt Col*

Honored Engineer Reaps Rewards After 'Retirement'

Accumulation of awards by one of the U.S. Army's most frequently honored civilian engineers, Jack H. Eggert, logically should have ended six years ago when he formally "retired" after 23 years service, but his achievements still draw recognition.

Credit for saving the Army $146,900 through the Value Engineering Program and a Certificate of Commendation for outstanding performance of duties from May 1, 1968 to April 1969 have been added to a long list of Eggert's citations, it was announced early in October.

Eggert began his Civil Service career at Fort Monmouth, N.J. currently the headquarters of the U.S. Army Electronics Command, in 1940 and labored there until he "retired" in 1963—only to be called back into service in the Vietnam War. Again he earned numerous citations for "expediting completion of major communications projects."

Following 16 months in Southeast Asia as chief engineer of the 1st Signal Brigade, Strategic Communications Command, and special assistant to the brigade commander, he went to Germany in November 1967 as chief engineer, U.S. Army STRATCOM Europe, in Heidelberg. He is special engineering assistant to the commanding general.

Jack H. Eggert

Eggert's $146,900 VE achievement was "analyzing alternate methods for performing the signal line filter function of the EUCOM Command Center."

In addition, he was officially commended for outstanding performance of duties—"continuously demonstrated unusual problem solving ability under extreme pressures . . . outstanding self-dedication, where provisions of analysis, judgment, engineering and management were brought forth in an exceptional manner."

Among Eggert's accumulation of awards are the Medal of Freedom, two Exceptional Civilian Service Awards, several Meritorious Civilian Service Awards, a Superior Accomplishment Award, and more than 100 letters of commendation and appreciation.

Edward J. Kelly III received the first Oak Leaf Cluster to the BSM for meritorious service during military operations in the Republic of Vietnam, July 1967 to July 1968. He served consecutively as Brigade S–1 and as executive officer, 4th Battalion, 12th Infantry, 199th Light Infantry Brigade. He is assigned to the Programs and Budget Division, OCRD.

CW3 James W. Birchfield, Aviation Branch, Redstone Arsenal, Ala., received the BSM for previous service with the First Radio Research Company in Vietnam.

MEDITORIOUS SERVICE. *Col William V. Davis* received the Meritorious Service Medal for his performance from 1966 to 1969 as executive officer at HQ Stuttgart Medical Service Area in southern Germany. He is executive officer, HQ U.S. Army Medical Research and Development Command, which directs 14 separate medical research units throughout the world from its headquarters in Washington, D.C.

The MSM also was presented recently to *Lt Col John E. Hill Jr.* in the Army Surgeon General's Office. He was cited for an outstanding record as a clinical expert in internal medicine and cardiology, including his service as a consultant, while assigned to the Directorate of Professional Service, Office of The Surgeon General.

JOINT SERVICE MEDAL. *Col Eugene J. McGinnis,* now chief of staff at the U.S. Army Missile Command, received the Joint Service Commendation Medal (JSCOM) for his achievements as chief of War Plans Branch and as chief of the Plans Division, Logistics Directorate, HQ U.S. European Command.

Lt Col Wayne B. Miller Jr., product manager for MARS II at Redstone (Ala.) Arsenal, received the first Oak Leaf Cluster to the JSCOM for achievements as foreign military sales officer, Army Section, and as chief of the Joint Sales Branch, Joint Logistics Section, HQ Military Assistance Advisory Group, Federal Republic of Germany.

COMMENDATION MEDAL. Col Paul R. Cerar, Edgewood (Md.) Arsenal commander, presented the Army Commendation Medal (ARCOM) to *1st Lt Paul A. Burns* for his contributions to the testing of an experimental item for detection of chemical agents while attached to the Arsenal's Defense Development and Engineering Laboratories.

SFC Robert L. Honeycutt, U.S. Army Engineer Reactors Group (USAERG), Fort Belvoir, Va., was awarded the ARCOM for meritorious service as noncommissioned-officer-in-charge of the USAERG's Advanced Power Conversion Experimental Facility, November 1964 to August 1969.

Nurse's Letter Endures 25 Years After Death

On Oct. 21, 1944, 2d Lt Frances Y. Slanger, a U.S. Army Nurse with the 45th Field Hospital in Belgium, wrote a memorable letter to the editor of the European Edition of the *Stars and Stripes.*

Much of what she wrote a quarter of a century ago could have come out of Vietnam today. She put into words the pride shared by all nurses in seeing their patients returning to health, and their admiration for the combat soldier. She wrote, in part:

". . The fire is burning low and just a few live coals are on the bottom. With the slow feeding of wood and finally coal, a roaring fire is started. I couldn't help thinking how similar to a human being a fire is; if it is not allowed to run down too low, and if there is a spark of life left in it, it can be nursed back - so can a human being. It is slow. It is gradual. It is done all the time in these field hospitals. . . "

That night Lt Slanger was killed by a German shell. She was the first American nurse to die in action in the European Theater. Her letter was published as an editorial before the newspaper learned of her death. The response was overwhelming.

Frances Slanger grew up in Roxbury, Mass., and was a graduate of Boston City Hospital School of Nursing. She entered military service Aug. 2, 1943, and served at Fort Devens, Mass., before going overseas.

Regulation Aids Inventors

Publication of AWC Regulation 70–7, intended to facilitate submission of disclosures for patent applications for inventions, has been announced by HQ U.S. Army Weapons Command.

Titled "Invention Evaluation and Patent Protection," the regulation provides that prospective inventors can submit a brief outline of an idea to the WECOM Invention Evaluation Committee. This permits evaluation of the idea with respect to probability of issuance of a patent without all the paperwork required for a full-scale patent application.

AVLABS Honor Employes at Annual Awards Banquet

Outstanding contributions to U.S. Army Aviation Materiel Laboratories operations during 1969 earned citations, $350 each and lapel pins for three employes Oct. 11 at the 4th annual AVLABS Awards Banquet.

The Director's Award for Technological Achievement was presented to Irving E. Figge in recognition of his work in advancing knowledge of structural methods and materials for aircraft.

The citation credits Figge with "new aircraft structural concepts," invention of bitetrahedron cord material, publication of a series of monographs on "Residual Strength of Stiffened Aircraft Panels," and a variety of fabrication techniques and materials. He also was acclaimed for developing the AVLABS "crack-resisting system" on aircraft.

Herman I. McDonald Jr. received the Commander's Award for Exceptional Service, based on notable contributions to solution of complex structural dynamics problems related to the Army helicopter program and his "acquired expertise in the field of aircraft structures."

The Commander's Award for General Excellence was presented to Milton Dingus for exceptional performance of duties "without regard to the level of responsibility" of his position.

The laughs of the evening were reserved largely for Burleigh D. Johnson, recipient of a special award in "recognition of ability to meet the complications and complexities that exist in a diversified organization while maintaining a cheerful and aggressive outlook." He was awarded an elaborate humorous scroll and an engraved plaque.

AVLABS Top Award Winner for 1969 are (from left) Irving E. Figge, Herman I. MacDonald Jr., Milton Dingus and Burleigh D. Johnson.

MRC Selects Staff Members for 1969-70

Staff members selected by the Mathematics Research Center (MRC) for the 1969–70 academic year include 23 holdovers and 18 replacements, six from foreign countries. The policy is to invite distinguished mathematicians to serve each year, thus assuring a variety of top talent.

Located on the University of Wisconsin (U.W.) campus, the MRC is in its 13th year as a contract agency performing research in applied mathematics related to military needs.

Under MRC Director Dr. J. Barkley Rosser, staff members furnish assistance and guidance as requested to Army installations. Dr. Louis B. Rall is assistant director.

Staff members, on sabbatical leave from educational institutions, pool their knowledge to keep the MRC apprised of the latest trends in mathematics. New members, their academic affiliations and fields of mathematical specialization are:

Paul Camion, Universite de Toulouse, France, algebra, combinatorics, coding theory; James W. Daniel, U.W. Computer Sciences Department, numerical analysis; R. Wayne Dickey, U.W. Mathematics Department, nonlinear elasticity; Walter T. Federer, Cornell University, design and analysis of experiments and statistical genetics; and

John Gurland, U.W. Statistics Department, statistics and probability; George H. Knightly, University of Minnesota, bifurcation, partial differential equations, elasticity; Ulrich Kulisch, Universitat Karlsruhe, Germany, numerical mathematics; and

Lawrence H. Landweber, U.W. Computer Science Department, automata theory and computational complexity of algorithms; Donald A. Lutz, U.W., Milwaukee, ordinary differential equations; Garth P. McCormick, Research Analysis Corp., operations research, nonlinear programing; and

Klaus G. Ritter, Universitat Karlsruhe, Germany, nonlinear programing, spline functions, approximation theory; Peter D. Robinson, University of York, England; M. -C. Shen, U.W. Mathematics Department, magnetohydrodynamics, geophysical fluid dynamics; and

David A. Spence, Oxford University, England, fluid mechanics, integral equations and boundary value problems; Alan C. Tucker, Stanford University, combinatorial analysis, graph theory; Wolfgang Walter, Universitat Karlsruhe, Germany, parabolic partial differential equations; and John H. Williams, U.W. Computer Sciences Department, systems programing.

Holdover members include Fred G. Brauer, U.W. Mathematics Department, ordinary differential equations; Howard E. Connor, U.W. Mathematics Department, kinetic theory; H. Reynold Fiege Jr., U.W. Medical School, artificial intelligence; and

Thomas N. E. Greville, MRC, interpolation and approximation and actuarial mathematics; Bernard Harris, MRC, statistics, combinatorial analysis, probability theory; Te Chiang Hu, MRC, integer programing and network flows; and

Herman F. Karreman, MRC, stochastic processes; Charles H. Kraft, University of Montreal, Canada, statistics; Arthur S. Lodge, U.W. Department of Engineering Mechanics, polymer rheology, theory of viscoelasticity; Ralph L. London, U.W. Computer Sciences Department, programing theory, artificial intelligence; and

Olvi L. Mangasarian, U.W. Computer Sciences Department, nonlinear programing, optimal control theory; Henry B. Mann, MRC, statistics, group and ring theory; Ben Noble, MRC, integral equations, variational methods; Pedro Nowosad, MRC, functional analysis, eigenvalues of differential operators; and

Louis B. Rall, MRC, numerical analysis, integral equations, functional analysis; J. Ben Rosen, MRC, mathematical programing, numerical analsis; J. Barkley Rosser, MRC, logic and numerical analysis; Isaac J. Schoenberg, MRC, analysis and approximation theory; Howard Steinberg, New York University, elasticity, perturbation and bifurcation theory; and

Aaron S. Strauss, University of Maryland, perturbed ordinary differential equations and Volterra integral equations; Richard A. Tapia, MRC, numerical analysis, functional analysis; Constance Van Eeden, University of Montreal, Canada, estimation based on ranks; and

Michael J. Yohe, MRC, computer programing and topology; and Eduardo H. Zarantonello, MRC, hydrodynamics and functional analysis.

Hinrichs Named AMC Director Of Procurement, Production

General F. J. Chesarek, CG of the Army Materiel Command (AMC), has named Col (Brig Gen designee) Frank A. Hinrichs as AMC Director of Procurement and Production.

Brig Gen Michael E. Leeper vacated that position to become director, International Logistics, HQ, AMC.

Col Hinrichs was formerly executive officer, Office of Personnel Operations (OPO), HQ Department of the Army, where he served earlier as chief of the Ordnance Branch. In his duties he will furnish overall policy direction on all AMC procurement activities, including those at more than 150 installations and activities throughout the United States. Involving a current annual expenditure of $14 billion.

In 1967, he was commanding officer, U.S. Army Procurement Agency, Vietnam, and director of Procurement, 1st Logistical Command. He has also had a 3-year tour of duty in the Contracts Division of the Office, Assistant Secretary of the Army (Installations and Logistics), and battalion commander and materiel officer with the 51st Ordnance Group (1959–62).

A native of Stillwater, Okla., Col Hinrichs has a BS degree in general engineering from Oklahoma A&M College and MBA degree from George Washington University, Washington, D.C. He is also a graduate of the Industrial College of the Armed Forces.

MERDC ARU Reverts to MOBDES Detachment 1664

In line with a recent decision by Army Chief of Reserves Maj Gen William J. Sutton, the Army Reserve Unit at the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va., has reverted to Mobilization Designation Detachment 1664.

The group had been the 1621st Reinforcement Training Unit since 1965 after operating for a number of years as Mobilization Designation Detachment 39.

As the 1621st Reinforcement Training Unit, members had to be professional engineers or scientists potentially valuable in R&D activities; as Mobilization Designation members they must also be R&D-oriented and have a mobilization assignment.

The detachment is responsible for the training of its officers in both military subjects and orientation and training in advanced activities in research and development.

The unit is commanded by Col Adolph H. Humphreys, deputy chief, Military Technology Laboratory at the R&D Center, who said the detachment is planning for resumption of its annual summer R&D Seminar for Reserve officers. The seminar was instituted in 1958 and was held every year thereafter until 1969.

450 Explosives Leaders Exchange Views on Safety

The Armed Services Explosives Safety Board (ASESB), a Washinton, D.C.-based activity of the Office, Secretary of Defense, recently sponsored the 11th Annual Explosives Safety Seminar at Memphis, Tenn.

Approximately 450 explosives safety leaders from government, industrial and research organizations included representatives from the United States, United Kingdom, Australia and Brazil.

Presentations on scientific solutions to explosives safety problems were made by Col B. B. Abrams, U.S. Army, chairman of the ASESB; Dr. T.A. Zaker and E. A. Ahlers, Illinois Institute of Technology Research Institute; D. K. Parks, Falcon Research and Development Co., A. R. Schleicher, Research Triangle Institute; R. R. Watson, deputy director of safety, Ministry of Defence, United Kingdom; and Dr. R. W. Woolfolk, Stanford Research Institute.

General assembly sessions were supplemented by 40 specialized subject sessions on topics such as "New Explosives Compositions—Their Safe Utilization in Explosive Ordnance"; Ammunition and Explosives Production Line Safety Problems"; "Demilitarization of Ammunition"; and "Legal Liabilities of Safety Officers."

The Explosives Safety Seminar provides a forum that helps professional safety personnel to keep informed on new developments in explosives safety technology. The objective is to assure through education a high degree of safety in manufacturing, handling, storing and transporting of military ammunition and explosives.

The Armed Services Explosives Safety Board was established by Congress in 1928 to protect the public from undue loss of life or damage to property from accidental explosions, and to provide similar protection within Defense installations.

The board chairman is selected by the Secretary of Defense and a senior military officer is designated by each of the Military Departments. A staff of civilian explosives safety engineers provides support for board activities.

Col B. B. Abrams, U.S. Army, the current chairman, is a graduate of The Citadel and the Military College of South Carolina. He is a registered professional engineer.

Army Gunners Demonstrate Shillelagh Missile Accuracy

Punching bullseyes in tank-sized targets is almost routine for gunners firing the Army's Shillelagh missile system, as demonstrated by a gunner at Fort Knox, Ky., who had 130 hits in 134 attempts.

Soldiers at Fort Hood, Tex., proved more dramatically the accuracy of the system in recent gunnery practice. They used three ordinary soldiers' helmets for tragets and struck all three at a range of more than a mile. For this particular exercise, helmets were strapped to a target, two of which were moving.

Seven congressional observers visiting at Fort Hood watched the demonstration in which missiles were fired from the General Sheridan assault vehicle, first armored vehicle to be "mated" with the Shillelagh missile system.

Firings were conducted by gunners from the 3d Squadron, 1st Cavalry, 1st Armored Division at Fort Hood, commanded by Maj Gen John K. Boles Jr.

The Shillelagh system is now being deployed with Army troops. The Shillelagh program is managed by the U.S. Army Missile Command, Redstone Arsenal, Ala., with Col Robert W. Proudfoot as project manager.

SHILLELAGH ACCURACY is evidenced by helmet struck by a missile at a range of more than a mile. Holding the helmet that was used in a firing demonstration at Fort Hood, Tex., is Charlott Green, a secretary in the Shillelagh Project Office at the U.S. Army Missile Command, Redstone Arsenal, Ala.

Army Awards $185,472 For Liquid Distributor

Dust palliatives for treating airfields, helipads, roads, oil storage tank dykes, drainage ditches, and hospital, troop and storage areas may be spread easier with a new type of liquid distributor being developed by the Army.

Under a $185,472 contract with the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va., the prototype is being built by Barnes & Reinecke, Inc., Chicago.

The universal liquid distributor will be a combination on- and off-road vehicle, capable of applying liquid latex dust palliatives, as well as bituminous liquids at varying rates up to 300 gpm. Fully loaded, it will travel in convoy at 35 mph, cross-country at 10 mph, and ford water 30 inches deep.

The distributor will have two compartments, one a 200-gallon capacity water prewet system, the other a 2,000-gallon capacity dust palliative material system, complete with a heating unit for hot bituminum use if required.

Watervliet Scientist Seeks Patent on Electrodeposition

Watervliet Arsenal scientist, Dr. Iqbal Ahmad has filed an application with the U.S. Patent Office disclosing his invention relating to the formation of composite materials by electrodeposition.

The invention, which eliminates faulty voids in the material, is titled "Composites Including Electroconductive Reinforcing Material Formed by Electrodeposition and Method of Forming the Composites."

Dr. Ahmad is chief of the arsenal's Physical Chemistry Laboratory. Work in the field of composites ranks high in the arsenal's effort to develop materials possessing the high strength and modulus-to-density ratio and high-temperature capability required to meet the demands of weaponry.

Dr. Ahmad has had four invention disclosures in the field. In April 1969, he filed application for a patent for his invention relating to the electrodeposition of metals and alloys under influence of a centrifugal force field.

Technical Data + Configuration Management + Computer Programs = Data Control

By Ralph E. Armbruster

Ralph E. Armbruster, deputy chief, Production Engineering Division, Engineering Laboratory, has been employed since 1961 at the Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.

Armbruster was awarded the Commanding Officer's Medal for Leadership in 1964 and has received two Quality Increase Awards. He attended New York University and George Washington University, receiving a BS degree in mechanical engineering from the latter in 1951.

Technical data requirements for military procurement become more exacting in proportion to the availability of funds for procurement and the concurrent tightening of competition among the hardware producers. Furthermore, the ever increasing rate of growth of technical data emphasizes the need for more exacting management and control of this data.

The concepts and philosophy of configuration management provide some of this control but, at the same time, increase the amount of paper to be managed. Thus, it is evident that realistic control of data, as well as management programs, requires automated system application. These systems are available today for implementation within the technical data banks charged with repository responsibilities.

The automated system application set forth in this discussion pertains to that technical data defined as drawings, parts lists, data lists, quality assurance documentation, referenced specifications and standards, Engineering Change Proposals, Notices of Revision, and any other supporting data normally associated with the technical data repository functions.

The system is predicated on the fact that all graphic technical data is stored on 35mm microfilm aperture cards and all alphameric data is either stored on tab-card-size microfiche or is computer based.

The concept of the automated system is a logical outoutgrowth from the aperture cards prepared under MIL–Standard 804 requirements. The key-punching, appearing on the aperture cards or on slave cards, provides the means for automatic data processing (ADP). Utilization of the keypunched information plus available microfilm engineering information systems formed the basis for the system designed by the U.S. Army Mobility Equipment Command Research and Development Center (MERDC), Fort Belvoir, Va.

MERDC's total system consists of two subsystems—the Microfilm Aperture Card Automated Retrieval System (MACARS), which provides storage and retrieval of the 35mm or equivalent microfiche cards, and the Report Generating System providing the storage, manipulation and retrieval of the alphameric technical data base. Both systems provide management listing for data control.

To understand the total system application, it is necessary to consider the process involved in entering the data into the computer—a tedious and painstaking procedure. Using a drawing as an example, the following information is extracted from the drawing and placed on a load sheet as lien items: drawing number, nomenclature, revision letter, date of release, next higher assembly number, major item assembly number, level of assembly, quantity, find number, unit of issue and Federal Stock Code for Manufacturer.

Additional line item entries are made for each specification, standard or other reference on the drawing. An average of seven line-item entries is required for each drawing. Each line-item entry becomes a punched card for computer loading. Each element making up the line-item entry is called a data element as defined in the AMC Data Element Dictionary prepared by the Auomated Logistics Management Systems Agency (ALMSA).

This loading procedure has been designated as a Generation Parts Breakdown (GPB) procedure. It creates the data base composed of the data elements listed above and provides the capability for computer updating of the data (revision letter changes, adds, deletes). Data manipulation for management control is a matter of programing—it even provides a means of aperture card retrieval from MACARS.

Obviously, the first management tool obtained from the system is the GPB, which is a family tree or next higher assembly tabulation used for configuration management studies. The GPB provides a simple listing of the lower level documents affected by the change proposal, showing all next higher assembly levels of documents affected, if any. It also lists all other systems affected and within those systems the higher and lower levels of documents.

The second management tool obtained from the system is the Technical Data Package List (TDPL). The TDPL is a tabulation of all documents required to complete the major item assembly involved. It lists all drawings, parts lists, quality assurance documents, referenced documents and outstanding changes required to prepare a technical data package of the latest vintage.

The TDPL ensures data package completeness, provides the users with control lists of the various categories of data, and permits case file maintenance for historical purposes.

In a TDPL, the capability also exists for automatic preparation of technical data packages at any level of assembly from major subassemblies down to piece/parts. These packages list all required documents, including referenced specifications and standards. A segmented TDPL is ideal for secondary item procurement of repair parts since it includes outstanding changes.

For configuration management, the control of all Engineering Change Proposals and Requests for Deviations/Waivers is attained through the use of Lists of Outstanding Changes. The system is predicated on the establishment of baseline documentation for a given contract. All approved change proposals affecting that baseline are described on Notices of Revision incorporated through contract modification.

No actual document revision is prepared during the life of the contract. The automated system provides quick response, configuration management control, and an historical file of actual contract documentation.

The TDPL, or the segmented TDPL, serves to pull from the MACARS the aperture cards for a technical data package. The MACARS consists of a Mosler Model 410/40 module with a capacity for 200,000 aperture cards. The module is under computer contract and four modules may be combined in one system.

The MACARS is designed to handle three basic functions—aperature card storage and retrieval, digital and graphic file maintenance, and preparation of pertinent data management reports.

The aperture card retrieval function will permit the automatic retrieval of aperture cards and will include the housekeeping activities needed to assure data base integrity and to

permit the preparation of data management reports.

File maintenance will permit the addition, deletion and revision of aperture cards in the graphic data base and update the associated digital files to reflect these transactions. In addition, the programs will permit changes and edits to be made to the digital data base.

These data management reports include a MACARS Location Contents Report, a System Request Control Report and a Graphic Data Base Activity Report. The MERDC design is planned as an ultimate data link with Headquarters in St. Louis, Mo., to provide a single control for the issuance of current technical data packages.

The combined Report Generating System and MACARS provide excellent data control. All alphameric data will be computer based. All data elements are DoD standardized. All updates are accomplished by the computer across the total data base. Data control is maintained through data links regardless of user location.

The system is capable of including compressed graphic data when the state-of-the-art matches the alphameric data capability for computer storage and retrieval. In the meantime, technical data control is a working fact at MERDC.

Army Quiet Observation Aircraft Described

Details of a quiet observation airplane developed for the U.S. Army Aviation Systems Command under contract were announced Oct. 13.

Adapted from the Schweizer SGS 2–32 sail plane, the new YO–3A is powered by a 6–cylinder engine that turns a 6–bladed wooden propeller. A large plastic canopy gives the 2–man crew excellent visibility.

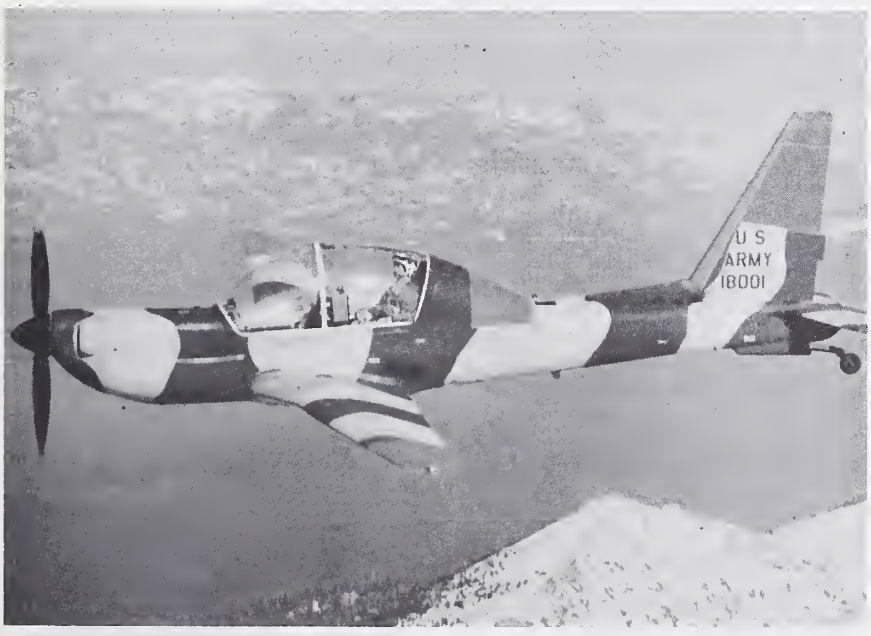
The 30-foot-long aircraft has an unusual wingspread of 57 feet, requiring little power to keep it aloft on flights of long duration.

Lockheed Missiles and Space Co. designers strengthened the wings to carry extra weight, reconfigured the craft from a high- to low-wing design, and added a conventional 3-wheel landing gear retractable into the wing.

Streamlined fiberglass fairings and cowlings have enabled engineers to keep an efficient aerodynamic shape.

Lockheed has been conducting studies and doing independent development work in acoustic measurement techniques and quiet aircraft technology for more than three years. The YO–3A is an outgrowth of the company's independently developed silent-flying Q-Star, built and tested before Lockheed received the Army YO–3A contract.

The Q-Star, in recent tests, became the first aircraft in the U.S. to fly using a Wankel-type rotary combustion engine developed by Curtiss Wright Corp. Flight test engineers reported the "revolutionary engine" has the potential to give more power from less weight than standard reciprocating engines, and that it is inherently more quiet.



Army YO–3A Observation Aircraft

Antiradiation Drug Tested For First Time on Humans

Testing of an antiradiation drug for side effects in human volunteers for the first time since the Army Radiation Protection Program began 10 years ago was announced by the Office of The Surgeon General Oct. 15.

Compound 638 corresponded when tested in humans with its toxicity at the same dose level in experiments on large animals, according to the Radiobiology Research Branch, U.S. Army Medical Research and Development Command, Washington, D.C.

Although the 11–gram daily dose given orally to the volunteers was essentially nontoxic, the announcement pointed out that this dosage is not considered protective against the harmful effects of ionizing radiation. Explosion of a nuclear weapons can spread such radiation over wide population areas.

Significance of the first testing of an antiradiation drug on humans, it is explained by Army researchers, is that they now can expect the same toxicity, or lack of it, in humans as has been observed in laboratory animal models for Compound 638.

Tests of other antiradiation drugs on human volunteers are planned. Investigators are hopeful that a more effective protective drug, Compound 2721, will be easily tolerated in humans. Since humans are not subjected to harmful ionizing radiation during testing, presumably radiation-protective dosage must be investigated.

Goal of the Army Radiation Protection Program is to find a drug that protects the individual without harmful side effects. Drugs tested early in the program caused about 10 percent fatality in experimental animals. The newer compounds demonstrate greater protection against radiation with fewer side effects.

AMOS Project Officer Assigned

AMOS (Automated Military Outpatient System), a project in the experimental stage at DeWitt Army Hospital, Fort Belvoir, Va., eventually is expected to cover every facet of information collection and dissemination necessary to the Army Medical Department's outpatient health service system.

Maj Henry M. Tufo, a 1964 graduate of the University of Illinois School of Medicine, is project officer for AMOS. He interned at the Presbyterian-St. Luke Hospital in Chicago and took his residency training in internal medicine at University of Illinois Hospital.

AMMRC Investigates Composite Materials for Army Applications

By Dr. George R. Thomas

Responsibility for investigating materials for Army applications has been assigned to the Army Materials and Mechanics Research Center (AMMRC), Watertown, Mass., by HQ Army Materiel Command.

The Army Aviation Systems Command (AVSCOM) has given the AMMRC responsibility for applying composite materials to Army aviation. The Army Aviation Materials Laboratory (AVLABS) will use these materials in aircraft, requiring close coordination between AMMRC, AVLABS and AVSCOM.

Army requirements for composite materials stem from the Army Air Mobility Program. Army helicopters require high-strength lightweight materials with excellent fatigue properties. All of the data which has been developed indicates that composites will have the superior mechanical properties Army aviation requires.

Furture helicopters in the Army arsenal will be the Utility Tactical Transport Aircraft System (UTTAS), which will replace the UH–1 Huey series, the Light Tactical Transport Aircraft System (LTIAS), which will replace the CH–47 Chinook series, and the Heavy Lift Helicopter (HLH), which will replace and increase the payload of the CH–54 Flying Crane. The arsenal will include a Light Observation Helicopter (LOH) and an Armed Helicopter Gunship.

Army helicopters in the future will have design and materials problems that cannot be solved except by use of advanced composites. For example, a single-rotor HLH will require blades 70 feet long. The extrusion press capacity required to fabricate a one-piece titanium spar for this blade does not currently exist in the U.S., but use of composite materials should solve this problem.

In the materials research community, the tendency is to criticize the designer for not making immediate use of new materials and to chastise the managers for not insisting that the composites be put to use today. If those people would just "get with it," we like to believe all of our problems would be solved and we could get on to better things.

In view of the fact that "those people" have not responded with the enthusiasm that the materials community had hoped for, and since as designers and managers they are our customers, we must ask why they are not yet buying our superior materials.

Designers and managers alike want to produce a better item for the Army. When choosing a material, they utilize the following selection criteria: materials costs, fabrication costs, mass fabricability, quality assurance, performance gains, reliability and maintainability.

A new material, such as an advanced composite, must be compared point by point against the presently used materials, and rejected if it does not compare favorably in all areas. In a material development program, one must, of necessity, address each specific characteristic of a material to determine which is the most likely to become its "Archilles' heel."

Let's consider some examples. A high-payoff application area is the composite rotor blade, which can utilize the higher efficiency variable area, variable taper, and variable twist airfoil contours that cannot be easily fabricated in metals.

A fiberglass rotor blade has been made for the CH–47 by Boeing Vertol and is now being flight tested under an AVLABS contract. Preliminary data indicate that speed can be increased by 30 percent and payload by 15 percent. The whole flight envelope has been expanded beyond the CH–47C flight envelope.

Referring to the material evaluation criteria, *materials costs* have been established and are within reason. *Fabrication costs* have not been established, although these first blades were quite expensive. *Quality control* procedures were elaborate, but the *reliability* or *maintainability* of these blades is not yet determined. Until these answers are available, the designer/manager is justified in not accepting the glass blade at this time.

Boeing-Vertol has been fabricating boron/epoxy rotor blades for the CH–47, originally under Air Force and now under AVLABS sponsorship. However, we have problems in trying to satisfy the designer/manager.

The price of the fiber is the first hurdle. The designer must answer the question: Will the final price of the blade be justified by the performance gain? Until the flight tests have been conducted, it would be fruitless to conjecture what the conclusion might be. This is especially true since the glass blades have performed better than design predictions.

Provided the data when available demonstrate a high degree of superiority over previous blades, we will have to take a "hard" look at all of this information to answer a host of questions, such as:

- Is the increase in performance uniquely due to the boron fiber?

  Is the performance increase worth the cost?
- Would the increased boron requirement reduce the cost?
- Can we achieve the same effect

Dr. George R. Thomas is chief, Fibers and Polymers Division, U.S. Army Materials and Mechanics Research Center, Watertown, Mass., and has been employed in Army research and development activities since 1954.

Backed by a BS degree (Cum Laude) from Bowdoin College in 1941 and a doctorate in organic chemistry from Northwestern University in 1948, he became a research associate at Boston University and Harvard until 1952.

For the next two years he was a projects director, Boston University and then entered U.S. Government service as a supervisory chemist at the Army Natick (Mass.) Laboratories.

In 1956 he became assistant chief for R&D in the NLABS Chemicals and Plastics Division. Promoted to chief in 1958, he served in this capacity four years, followed by six years as associate director, Clothing and Organic Materials Laboratory, NLABS, until promoted to his present position.

Dr. Thomas completed the Advanced Management Program training at the Graduate School of Business Administration, Harvard University, in 1962 and in 1966 became the first representative from one of the Army Materiel Command central laboratories to graduate from the National War College.

He is the author of 12 technical publications, has been granted four patents on inventions, and is a member of the American Chemical Society, American Academy for the Advancement of Science, American Society for Testing and Materials, and the Harvard Business School Association.

through exploiting combinations of glass fiber and boron fiber or any other high-nodulus high-strength fiber (graphite)?

The first three questions are basically problems in arithmetic and require little or no investigation at this time. The fourth question requires engineering data presently unavailable.

Accordingly, we have several small efforts in this area that we believe will enable us at least to make a qualified judgment when the time comes. Ongoing activities include sample fabrication and testing, and studies in the micromechanics of mixed modulus composites.

The Army is establishing a program to fill in the gaps in data for the materials evaluation criteria. The key to this program is automation of the manufacturing process.

An automated tape layup machine is being developed at Boeing-Vertol Co. This is a proposed 5-axis machine: X, Y and Z Travel, tape head rotation, and work piece rotation.

Designed for production of helicopter rotor blades, the machine should reduce fabrication time from 300 hours to less than 8 hours. This will accomplish a number of objectives at once.

Referring to our material evaluation criteria, we will have a manufacturing process that can be reproduced to meet *mass production requirements*; second, we should reduce *fabrication costs*; third, we should have good *quality control* from blades fabricated in this way. We will then be in a position to get good data on *reliability* and *maintainability* in actual flight tests.

Turning to other components, work under an AVLABS reduction of vulnerability study has demonstrated that control rods can be made from fiber-wound tubes and that they will offer some increase in ballistic damage tolerance. A possible design for a pitch-link rod uses a double winding over a foam core. The two windings are made either at different angles or with different materials.

The outer winding is the stiffer of the two and carries all of the load. If it fails, the load automatically transfers to the inner winding while the outer winding gives an indication of failure.

Again, we will have to address the material evaluation criteria before we can use this concept in either existing or future aircraft.

In a similar vein, power transmission shafts can be made with fiber-reinforced tubes. A proposed design for a section of a tail motor drive shaft uses a $\pm$ 45° boron/epoxy layup with metal end fittings.

This shaft is lighter than the comparable metal shaft and is sufficiently stiff that one could eliminate a number of the Thomas flexible couplings and shaft supports, at an even further weight reduction. These advantages will continue to lay in the land of speculation until we can gather the data required by the Army and by the manufacturer.

Closer to home, work at AMMRC in the composite materials field includes studies of carbon-filter surface properties and the micro-mechanics of crack propagation in stiffened composite panels.

Work is also being done on the characterization of composite materials as a function of environment, since Army aircraft must be able to operate from arctic to high-temperature, high-humidity jungle-type environments.

AMMRC is awarding a few contracts for work on composite materials: a composite bearing, a carbon-fiber control system component, and a nonlinear study of adhesive bonded composite joints.

The AMMRC proposed FY "71" production base support program for composites in aircraft includes further work on the glass blade, a boron/epoxy rotor blade, work in graphite—again as applied to rotor blades, high-strength cables, various helicopter structures and light-weight composite armor.

The reason for concentrating on helicopter rotor blades is that this is the most cost-effective area for composite material usage. Rotor blades were originally made from wood. They were hand-sanded to complex airfoil shapes. Because of water vapor sorption, warping, and the large amount of hand labor, wood blades were replaced with metal blades.

The complex contours of the wood blades could not be reproduced in metal blades without a great deal of highly expensive machining. Therefore, the metal blades were less efficient. Now, with composite materials the rotor blade can again be made to the more complex, higher efficiency contours, with a resultant increase in performance.

I have attempted to show that composite materials are being studied for Army applications; that while we are in sympathy with the fervor of the champions and devotees of composite materials, those who sit in judgment —managers both in Army and in industry—have, with good reason, not yet become addicted to the cause; that we are not mounting a massive assault, in a monetary sense, to solve all the problems (although we would like to); but that we are probing critical problems which will signal go or no-go to the program. I would like to close on the optimistic side in stating that it is my personal belief that all signals will be "go."

AF Colonel Heads DCA Field Office at Army Installation

Col John W. Oliver, U.S. Air Force, has been assigned as chief of the Defense Communications Agency's Satellite Communications Field Office, collocated with the U.S. Army Satellite Communications Agency at Fort Monmouth, N.J.

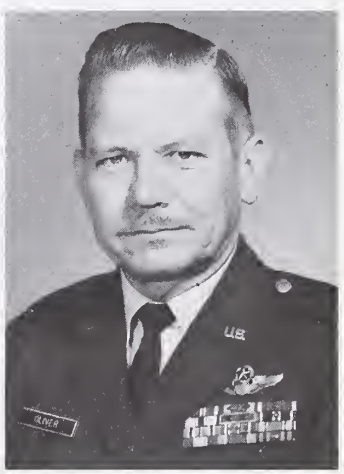
The assignment follows two years with the Space and Missiles Systems Organization, Air Force Systems Command, as deputy chief, Plans and Operations Office.

Col Oliver attended Texas A&M College for two years prior to entering World War II and received his BS degree from Louisiana State University in 1959. He was commissioned in the U.S. Army Air Corps in 1943 following enlistment in the Infantry in 1942, and in 1944 logged 50 combat missions in Italy, France, Germany and the Balkans.

Triple-rated as bombardier, navigator and command pilot, he is a single engine jet fighter pilot and has flown bombers and transports.

He was frequncy controller for Joint Task Force-8 in testing nuclear weapons at Christmas and Johnson Islands in 1962 and spent seven years with the Air Force Satellite Control Facility as commander of the Kaena Point Satellite Tracking Station in Hawaii, and deputy chief, Plans and Operations, Space and Missiles Systems Organization in Los Angeles.

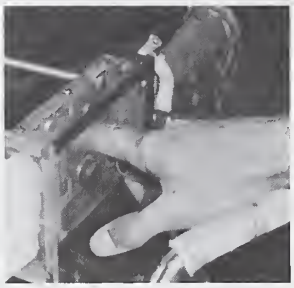
He is a graduate of the Air Tactical School, Ground Electronics Officers Course, Communications-Electronics Staff Officers Course, Personnel Management for Executives, and other flying and technical courses.

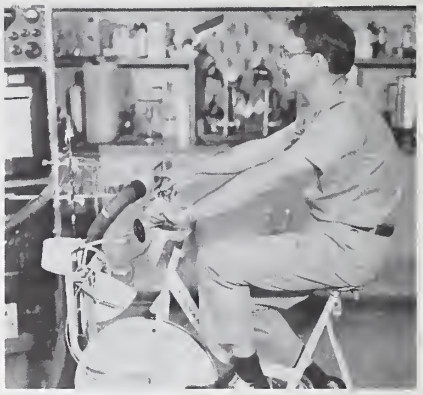


Col John W. Oliver

Research Institute of Environmental Medicine Aims At Protection of Soldier for Maximum Effectiveness

By Dr. David E. Bass





ARIEM researcher rides ergometer while holding his right index finger in a miniature wind tunnel. The ergometer measures output of energy while combinations of wind and temperatures are passed across the finger at any desired velocity. This experimental technique is designed to study how exercise at controlled rates acts as a deterrent to frostbite, one of a soldier's environmental hazards.

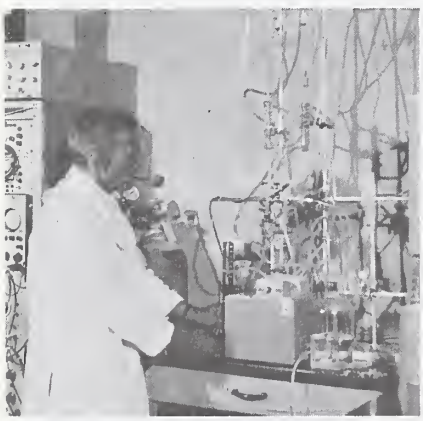
Physiologically, medically and physically, the body of the soldier is no different from that of the civilian in its responses to climatic extremes. The soldier, however, cannot afford the luxury of coming in out of the cold, getting away from the heat, coming down off the mountain, or stopping whatever he is doing simply because he is tired and uncomfortable.

This requirement to keep on the job, regardless of discomfort, makes the body reaction of the soldier critically different from that of the civilian during exposure to environmental extremes. Some of the soldier's physiological responses to environmental extremes, while of great value to him as a (civilian) biological entity, can be positively dangerous when he must accomplish military missions.

An important function of the U.S. Army Research Institute of Environmental Medicine (USARIEM), therefore, is to inform the military of those physiological responses which are beneficial to both the military and the civilian, and those which pose a threat to the soldier, despite the fact that the same response protects the civilian organism from harm in environmental extremes.

Considerations involved in that broad responsibility played a large role in formulating the mission of USARIEM, which is:

"To conduct basic and applied research to determine how heat, cold, high terrestrial altitude, and work affect the soldier's life processes, his performance and his health. The goal is to understand the complex effects of climatic stresses on the human body, the body's defenses, and the techniques, equipment and procedures best calculated to make the soldier operationally effective to an optimal degree and give him optimal environment protection."



Dr. Roy Burlington, ARIEM staff physiologist, checks apparatus for testing effects of low oxygen, cold or other environmental factors on biochemistry and physiology of isolated rodent hearts. The tests help scientists understand the effects of subnormal body temperature (hypothermia) and low levels of oxygen (hypoxia).

In the discharge of this mission, four approaches are used: (1) clinical problems associated with disabilities due to environmental extremes; (2) performance of the soldier; (3) supporting basic research; (4) provisions of consultations, end item tests, and studies of an *ad hoc* nature. Response in category 4 usually is to specific requests from other elements of the military establishment that require the expertise peculiar to UARIEM's multidisciplinary professional staff.

USARIEM was activated in October 1961 as a Class II installation of the Medical Research and Development Command on the grounds of the U.S. Army Natick Laboratories (NLABS). The original staff was 45 civilian and military scientists and technicians. All had been with the Environmental Protection Research Division of the then Quartermaster Research and Engineering Command Natick, Mass., or at the Medical Field Research Laboratory, Fort Knox, Ky.

Temporary laboratory and office space was provided at Natick Labs but the Institute, grown to its 178 personnel, moved to a new building on the grounds of Natick facilities near the shores of Lake Cochituate, 17 miles west of Boston, in 1968.

Containing 76,000 square feet of floor space, the 3-story structure is one of the most advanced, sophisticated research buildings in the world devoted entirely to problems of military environmental medicine.

Modern laboratories are equipped to support research in physiology, biochemistry, pharmacology, psychology, physical anthropology, histology, pathology, medicine, physics and veterinary medicine.

The laboratories do not in themselves make USARIEM unique. This quality derives from highly specialized environmental chambers capable of supporting human research in a wide variety of simulated environmental extremes.

Fourteen envronmental rooms are collectively capable of providing controlled temperatures ranging from —40 to +140° F. Two altitude chambers with an airlock can simulate altitudes up to 25,000 feet, control temperature from —30 to 105°F., and change humidity from 20 to 80 percent. One of these chambers can accommodate 10 men and the other 20 men. Both are believed unique in that they can be operated for 24 hours a day, several days in succession.

Another characteristic of the altitude chambers is the capability of controlling the gaseous atmosphere to provide any desired combination of concentration of three gases—carbon dioxide, oxygen and nitrogen.

The world-famous tropical and arctic chambers of the Natick Laboratories also are available to the USARIEM staff for studies requiring larger numbers of test subjects than can be accommodated in its own chambers.

USARIEM is equipped to support almost every known experimental technique within the disciplines mentioned earlier.

Equipment is available for thin layer, gas and liquid chromotography; also electron microscopy, automatic analysis of almost any constituent in body fluids, and scintillation counting for tracing distribution of impor-

tant substances within tissues and cells. Separation and analytical ultracentrifuges are provided.

Electronic instrumentation is capable of measuring such widely disparate functions as blood flow in minute vessels and evoked action potentials from the sensory cortex in response to visual stimuli. Computer laboratories give support to data analysis.

The animal housing is equipped to handle up to 11 different species of experimental animals, ranging from mice and ground squirrels through dogs to primates. It can house 2,500 mice, up to 30 monkeys, and varying numbers of other animals.

Physical facilities and modern equipment are, of course, only one side of the research coin. The other side is represented by the personnel who use the facility. In this respect, USARIEM is fortunate in having a staff that includes approximately 50 scientists at the doctoral level, representing all the disciplines mentioned earlier and mathematicians and computer experts.

Scientists and supporting technologists are grouped organizationally into eight laboratories: Behavioral Sciences, Biochemistry-Pharmacology, Experimental Pathology, Medicine, Military Ergonomics, Military Stress, Physiology, and the Army Medical Research Laboratory, Alaska (AMRLA).

Created in 1967, the AMRLA occupies the building that belonged in earlier years to the Arctic Aeromedical Laboratory at Fort Wainwright, Alaska. When the latter laboratory was deactivated, The Surgeon General of the Army was afforded the opportunity to establish a long-planned clinical research laboratory in Alaska for study of cold injuries.

SQUIRREL MONKEY is seated in restraining chair used for behavioral and physiological experiments. Six colored stimulus lights are slightly above eye level. The monkey's hand is on a response level. Tail shock can be administered through the tail stock and electrodes. By programing contingencies between the lights, lever presses and electric shock, behavior can be closely controlled to study various cardiovascular parameters.

The regularly budgeted research program is supported by three projects: Military Environmental Medicine (55%), Research in Biomedical Sciences (41%), and In-House Laboratory Independent Research (4%).

Research performed under Military Environmental Medicine has a multidisciplinary flavor which, more often than not, is directed toward a clearly definable military application. Research performed under the other two projects is discipline-oriented and is, in general, directed toward anticipating military problems of the intermediate and long range future.

Major research efforts have been in the areas of military performance, human adaptations to climatic and related stresses, the biophysics of clothing, the pathophysiology of environmentally induced diseases, e.g., cold injury, acute mountain sickness and heat stroke. These have produced a profile of past, current and future research that ranges from the most applied type of field studies to basic studies of the metabolism of isolated fat cells.

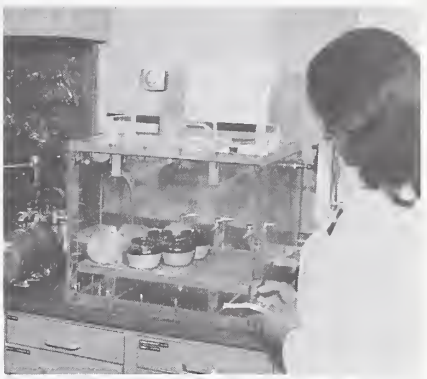
Field studies have been performed on Special Forces troops, marines and helicopter pilots. For example, the performance of a 120-man tactical group of Special Forces was evaluated at altitudes up to 14,000 feet in the Colorado mountains; at the same time the effects of a drug (acetazolamide) an acute mountain sickness were studied.

U.S. Marines have been studied during amphibious landing exercises to assess the effects of heat on fully-equipped combat troops during strenuous landing operations. From the results of such studies, guidance regarding limits of tolerance to work in the heat are prepared for field commanders.

The heat load on pilots of helicopters and fixed-wing planes with plexiglas canopies has been evaluated. Recommendations for changes in either doctrine or design have been made to take into account undue heat loads during hot weather in Vietnam.

Studies are being performed on effects of high terrestrial elevation on acute mountain sickness and on various physiological and psychomotor functions. In progress also is a study on the effects of posture on the ability of the soldier to acclimatize to work in the heat.

An interesting aspect of USARIEM's research in behavior patterns



ARIEM technician records results of an experiment involving study of metabolism of ^{131}I labelled Thyroxine in rats. The container in which the rats are placed is a hypobaric chamber simulating an altitude of 15,000 feet.

deals with studies of operant conditioning, where either humans or animals are conditioned to respond to a reward or an unpleasant stimulus.

By studying the behavioral patterns and the effects of environmental extremes on them, it should be possible to predict combat effectiveness under a wide variety of environmental and emotional stresses. Current research involves use of human volunteers, monkeys and rats exposed to cold, heat or altitude.

New insights are being obtained regarding the physiology and biochemistry of the heart muscle when exposed to extremes of cold. Comparisons of the responses of isolated hearts of hibernators with those of nonhibernators seek to determine why hibernators are more resistant to cold than are nonhibernators (including humans).

Development of the science of protective clothing design began early in World War II when the Army Surgeon General made available to the Quartermaster Corps some of its brightest young medical officers to do research on effects of heat and cold on the human body. From this origin has grown the concept of the biophysics of clothing, in which USARIEM is deeply involved.

Military economics is devoted almost entirely to studying the man-clothing-environmental complex from the viewpoint of providing guidelines to designers of protective clothing and equipment based on the physiological makeup and limitations of the human body. USARIEM scientists provide designers information on physiological testing of new uniforms of radical design or unprecedented use of new materials. Consultations are arranged regarding special problems, e.g., the impact of

(Continued on page 44)

USARIEM Activities Aim at Protection of Soldier

(*Continued from page 43*)

body armor on the soldier's ability to function in the heat.

Mathematical models are used to predict the environmental stress placed upon the soldier, based on knowledge of his level of activity, the physical characteristics of the uniform, its over-all design, meteorological readings, and other variables as they assume importance.

Effects of environmental stress on decision-making of older and more senior officers is an important new research area. It is well known, for example, that low oxygen in the atmosphere can impair the ability of an individual to think clearly. The importance of this factor in command decisions made at high altitude is quite obvious.

Using a combination of their own research findings, knowledge of the current state-of-the-art, and orientation toward the needs of the military, USARIEM scientists have provided a new insight into many environmental problems of the soldier.

With respect to problems of military operations in the heat, the pattern of acclimatization, its optimal course of development and retention, and a great deal of the underlying physiology have been elucidated.

The importance of this phenomenon in promoting combat effectiveness and reducing casualties is well recognized. Standard operating procedure now is to insure that soldiers are acclimatized to heat before they are committed to any strenuous duties in hot climates. Tolerance limits have been designed for various combinations of work and encumbering protective clothing and equipment, e.g., vapor impermeable.

USARIEM scientists have shown, in collaboration with scientists from Letterman Army Institute of Research, that heat rash, even though clinically cured, causes a significant impairment of the soldier's ability to function in a hot environment for as long as three or four weeks after disappearance of the rash.

Importance of prior cold experience in acclimatization to cold was pointed up as a result of a study on young Puerto Ricans who had never experienced cold. It was shown that with continued cold exposure, healthy young men can develop the ability to generate metabolic heat apart from shivering (non-shivering thermogenesis).

Very brief exposure to Arctic temperatures and high winds was shown to degrade visual performance significantly. Methods have been developed to predict the eventual loss of tissue following severe frostbite, on the basis of elevation of certain enzymes in blood (glutamine-oxalacetic transaminase and lactic acid dehydrogenase).

The importance of blood flow during thaw of cold injured tissue was elucidated and implicated in predicting the eventual tissue loss in a given cold injury situation.

Much new information on the differences between the heart of hibernators and those of nonhibernators in their ability to withstand cold has been brought to light. Effectiveness of norepinephrine and potassium in providing protection to hibernator hearts against cold has been determined.

Considerable research has been done in recent years on the effects of high terrestrial elevation. Significance of high-altitude acclimatization for optimal functioning of troops was well established in several field studies at altitudes up to 14,000 feet.

Effects of acetazolamide on symptoms of acute mountain sickness (headache, dizziness, nausea) were studied and this drug appears to have value in relieving these symptoms. High elevation was also shown to be associated with a considerable decrease in alertness, and in an increase in the time a soldier will take for a task if allowed to pace his own performance.

High terrestrial elevation was shown to have potentially important effects on action of some commonly used drugs. Amphetamines, for example, were shown to have a higher toxicity in mice exposed to simulated altitude; barbiturates were less effective at high altitude than at sea level.

USARIEM has become an important focus for symposia on environmental stress and related topics. A conference of great interest to the academic community as well as to the Army was the "Symposium on Biomedical Problems of Living and Performing at High Terrestrial Elevations," sponsored by USARIEM in October 1967. Participants came from all over the United States and from as far away as India and Peru. The published proceedings contained authoritative reviews of the state-of-the-art and have been very useful to scientists.

A Symposium on Physiological Basis for Human Work Performance was sponsored jointly by Boston University and USARIEM, in conjunction with the International Physiological Congress in 1968. It provided a series of authoritative overviews of the physiology of work in various life situations.

In summary, the goals of USARIEM are to:

- Perform basic and applied research in environmental medicine that will solve present problems and future requirements.
- Serve as consultants and a repository of expertise in environmental medicine for The Surgeon General and all Army elements.
- Provide guidance for rational doctrine in training and maintaining effectiveness of troops under all adverse climatic conditions.

Dr. David E. Bass, deputy scientific director and chief civilian scientist of USARIEM since May 1964, received an AB degree from Brown University, then spent a year of post-graduate study in physiology at Harvard University.

After serving nearly three years in the Army during World War II, he received MA and PhD degrees from Boston University School of Medicine, where he majored in medical sciences.

Since 1947 Dr. Bass has served as a biochemist at the Quartermaster (QM) Climatic Research Laboratory at Lawrence, Mass.; chief, Biochemistry Unit and chief, Physiology Branch, QM R&E Center, Natick, Mass.; and director, Division of Heat and Work Research, USARIEM.

Dr. David E. Bass

Honored by the QM General in 1953 with the QM Research Director's Award, he received a Secretary of the Army Research and Study Fellowship in 1959.

Dr. Bass is a member of the editorial board of the American Physiological Society and a Fellow of the American Association for the Advancement of Science. He holds professorial appointments at the Boston School of Medicine and at the University of Rhode Island. He has published more than 50 papers in the field of environmental physiology, with emphasis on human responses to heat and cold.

Recharging Science Administrators' Intellectual Batteries

By Dr. Carl Lamanna

When a scientist departs from the laboratory and assumes a post in research administration, he faces the prospect of obsolescence as a scientist. Demands of administration are such that by their very nature they direct the time, energies and thoughts of the person to social, financial, personnel and political questions.

The administrator may indeed draw upon his scientific training and professional experience to help in solving problems, but he is not himself probing for the solution of scientific issues. He is not engaged directly in exploring nature. Rather, he is engaged in manipulating human institutions organized for the purpose of exploring nature

Presumably, prior experience as a scientist at the work bench has made him a logical candidate for an administrative career—experience that makes him intellectually fit to enter the ranks of R&D administration.

The inspired university teacher, it is usually agreed, is the one who creates new knowledge or gains new insights into old knowledge. For this reason, most universities encourage teachers interested in doing basic research. The academic environment is by plan arranged to permit scientist-teachers to engage in scholarly activities, and often it also provides for administrative responsibilities.

In contrast, few industrial firms and fewer numbers of U.S. Government agencies plan to permit the scientist administrator to continue to pursue scholarly or "bench level" interests. This is unfortunate because evidence strongly supports the value of continuing research or other scholarly activities.

The amount of time and the level of effort, the physical facilities, and the necessary supporting staff for scholarly activity by administrators could be arranged. "Where there is a will, there is a way." The requirements would be quite varied, but surely not impractical if a willingness to support the concept were evident.

When the tempo of changing knowledge is a challenge to all scientists desirous of keeping up in their disciplines, as at present, it is prudent to consider the virtues of part-time laboratory research and other scholarly activities for administrators.

Arguments are offered against continued scholarly activities by the science administrator, such as:

- The administrative responsibility is so demanding it does not permit deviation by extraneous activity.
- The limitations of a person do not permit him to be a successful administrator unless he devotes full time to this task.
- The organization that employs the administrator has employed him for that task and not the task of scholarly or bench-level activities.

These arguments ignore the fact that man is a creature of habit, and a victim of myths. If the viewpoint is constantly mouthed that scholarly activity and administrative work cannot be mixed, people will believe this and make no effort to learn otherwise.

Arguments in favor of an administrator keeping scholarly and scientific interests alive by personal participation include:

- These activities permit him to relate to or feel for the problems and psychology of the bench worker. Thus, a provision is made for preventing the administrator from losing knowlege of and sympathy for the environment of the laboratory he is attempting to control and direct.
- Purely intellectual activities can make the administrator a wiser administrator. In terms of the social good, history offers few examples where parochialism has paid off for the manager, public official or dictator, that is, for any person attempting to regulate other people.

An organization, to be most effective, must recognize that people, including science administrators, are variable in their talents and needs. Thus, it would permit the administrator, who wants to and who can, to continue to have scholarly and bench-level interests. The organization should not, however, force the administrator who is not interested, though it should encourage such an interest.

Historically, there is a tradition in science of great science administrators not losing all their interests in scholarly and bench-level activity. Numerous examples can be found of scientists, engineers and physicians who successfully combine a career of administration with other professional and scholarly activities.

The tradition is particularly alive in the American university system. Many deans and even presidents of a university have continued to teach classes, write books and guide thesis research of graduate students.

A notable example in the area of defense research and development is world-renowned Dr. Vanevar Bush. In the military forces it has not been unusual for the Surgeon General to continue to see patients and perform other professional medical services while they were managing the medical departments of the Armed Forces.

Certainly it appears naive to believe that a good scientist will stop having creative ideas worth exploring by scholarly pursuits just because he has become an administrator. Many will be better administrators and policy-makers when an opportunity is afforded them to conduct a reasonable level of scholarly activity. The option should be available for programed time for scholarly-administrative-laboratory research duties.

Dangers that face the administrator in science, and the organization he serves, when he loses touch with his profession are being increasingly recognized by industrial and, hopefully, U.S. Government organizations.

Some academic institutions have begun to organize curricula for intellectually "retooling" the administrator in his science or engineering discipline. Government R&D organizations should recognize that arrangements to permit some modest level of continuing scholarly activity by administrators are highly desirable. Hopefully, it will be productive for knowledgeable persons to suggest the kinds of arrangements that are desirable, and how to make them available in a practical way.

Dr. Carl Lamanna has served since 1961 as deputy director and scientific adviser, Life Sciences Division, U.S. Army Research Office (USARO), Office of the Chief of Research and Development.

Director of the Naval Biological Laboratory at the University of California prior to joining USARO, he earlier served at The Johns Hopkins University as associate professor of microbiology in the School of Hygiene and Public Health.

Dr. Lamanna received BS, MS and PhD degrees from Cornell University and has been a visiting professor at the University of Washington, University of California at Berkeley and the University of the Philippines.

He is the author of more than 70 scientific papers and coauthor of Basic Bacteriology, *an advanced textbook used in universities and graduate schools in the United States and abroad.*

Patents Viewed as Economics Factor, R&D Information Source

By Bernard J. Ohlendorf

The author has been a patent adviser with the Office of Counsel, Edgewood Arsenal, Md., since September 1966, following more than four years as an examiner with the U.S. Patent Office in Washington, D.C. He holds a BS degree in chemistry from Loyola College of Maryland (1952) and an LLB degree from the University of Baltimore (1955). He is a member of the Federal Bar Association with authority to practice law in the State of Maryland, patent law in the U.S. Patent Office, before the U.S. Court of Customs and Patent Appeals, and the U.S. Supreme Court.

This article is a condensation of a recent address to the Edgewood Arsenal Chapter of the Federal Professional Association.

In considering the relationship of patents to the U.S. economy and to the scientific and engineering community, my observation is that most technical people are familiar with the patent system as a means of protecting their inventions. Many, however, do not realize how powerful a research and engineering tool patents can be.

For example, I have never been successful in convincing the publication-oriented individual of the value of patents in addition to publications. Section 102b of Title 35 of the United States Code provides that a patent will not be granted on an application filed more than one year after the invention is described in a printed publication.

Patent practitioners do not want to preclude any inventor or other technical personnel from publishing their concepts; neither do they want to be confronted by the statutory bar problem created by section 102b. Accordingly, technical clients are advised to publish their work but not to disclose the invention.

Obviously, then, many patents cover inventions that are not disclosed entirely in the publications. It does not require any great intellect to realize much information is contained in patents that is not available in any other publication. A literature search alone is not the entire solution to determining the area in which research should be conducted.

The engineer type has, on occasion, told me "Patents aren't important to the engineer; these are for the inventor types." Patents, in my opinion, are in many respects more important to the engineer than to the inventor types. Patents are not only a source of information regarding past engineering developments; they also indicate present engineering trends.

Failure to keep pace with patents leads to lack of knowledge in state-of-the-art areas. A scientist or engineer who does not know the art area in which he is working is not capable of doing his job. He should be given training to enable him to become competent in the art area to which he is assigned — or transferred to some other less demanding job.

It is satisfying to me to confront the publication-oriented individual with knowledge he could have found had he searched within the patent system to solve his problems.

A technical man recently presented an unsolicited proposal to me for advice, along with the art he had discovered in a literature search. Having worked in the art area myself, I told him that the proposal certainly was old in the art. Subsequently, three patents were found that were issued two years prior to the date of disclosure of his proposal. If a patent search as well as a literature search had been made, technical personnel involved could have been two years further along in their programs.

The United States Patent Office, now housed in Crystal City, Va., is probably the largest single source of technical information in the world. Patent files can serve not only as a means of avoiding duplication of expensive research; they can also serve frequently as a springboard for solving R&D problems.

For some time I have had the feeling that much shying away from patents by the technical type is due to the professional jargon utilized by patent lawyers in drafting applications and the claim therein. This is a rather small problem to overcome. I am convinced that the average engineer can do a capable job of studying any patent, and I am willing to help any technical man in studying the language of any patent directed to his attention. Any technical public servant who overlooks patents as a source of valuable information for his research is not using properly the public funds entrusted to his care.

Let us now look at the relationship of patents to the United States economy. Since the adoption of the Constitution, the United States has been transformed from a predominantly rural civilization to a complex society depending heavily upon sophisticated advances in technology for rapid economic growth.

New ideas, products and methods are creating new industries and new jobs that are increasing the gross national product of the United States each year. More goods are being produced at ever lower costs, and the American people are enjoying the highest standard of living in the world.

Can the remarkable economic progress of the United States be related to the patent system? While an economist would probably respond that this is a most difficult and complicated question to answer, I feel that it can be very simply answered by considering Article 1, Section 8 of the United States Constitution. This gives Congress the right to promote the progress of science and useful arts by securing, for a limited time, the exclusive right of authors and inventors to their respective creations and discoveries.

In 1790, the year after the adoption of the Constitution, Congress passed the first patent laws. This was the first time any country had written a patent law into its federal statutes.

The wordage limitation of this article does not permit extensive analysis in an effort to explain how the United States patent system has impacted beneficially upon our national economy. Within the past century, transportation progress alone, which is the crux of our economic growth, provides conclusive evidence. Even the centuries-old dream of man to travel through space at almost incredible speed to planets millions of miles distant has been achieved by recent technological advances.

In addition to that amazing testimonial to man's inventive genius to surmount, scientifically, seemingly impossible obstacles to envisioned progress, I would like to offer a list of what I consider to be 22 basic United States inventions that are contributing most importantly to our modern standards of living. They have been selected as exemplary in an attempt to show a relationship between patents and economic progress. Many others might well be added.

When one considers these 22 basic patents, the conclusion is clear that they account very substantially to industry and employment in the United

States. Without the benefit of these inventions, we could not have achieved the level of our so-called "affluent society." Inventions, as protected by our patent system, are in fact the firm foundation of economic growth and prosperity of our nation.

Major Inventions That Have Impacted Upon U.S. Economy

Invention	Patent No.	Year	Inventor
Telegraph	1,647	1840	Samuel F. B. Morse
Vulcanized rubber	3,633	1844	Charles Goodyear
Sewing machine	4,750	1846	Elias Howe, Jr.
Pneumatic process for making steel	16,082	1856	Henry Bessemer
Typewriter	79,265	1868	C. L. Sholes et al
Air brake	88,929	1869	George Westinghouse Jr.
Celluloid	105,338	1870	J. W. Hyatt et al
Automatic car coupler	138,405	1873	Eli H. Janney
Phonograph	200,521	1878	Thomas A. Edison
Barbed wire fence	157,124	1874	Joseph F. Glidden
Telephone	174,465	1876	Alexander Graham Bell
Internal combustion engine	194,047	1877	Nicolaus A. Otto
Electric lamp	223,898	1880	Thomas A. Edison
Induction motor	382,280	1888	Nickolas Tesla
Aluminum production	400,665	1889	Charles M. Hall
Linotype machine	436,532	1890	Ottmar Mergenthaler
Diesel engine	542,846	1895	Rudolf Diesel
Radio	586,193	1897	Guglielmo Marconi
Airplane	821,393	1906	O. Wright et al
Amplifying tube	841,387	1907	Lee DeForest
Bakelite	942,809	1909	Leo H. Baekeland
Manufacture of gasoline	1,049,667	1913	William M. Barton

Extra Dividends Reported For Government Research

"Extra Dividends from Government Research," by Richard L. Lesher, assistant administrator for Technology Utilization, National Aeronautics and Space Administration, is featured in the Second Quarter 1969 edition of *Perspective*, published by Cornell Aeronautical Laboratory, Inc.

Recent developments in government research listed as returning vast benefits to the civilian community include sharper X-ray pictures, longer-lasting paints, safer highways, improved ambulance service, tougher metal alloys, smaller TV cameras, new metal-working tools, and miniature medical instruments.

Noting that NASA's total R&D expenditures are about one-quarter of the current national total of $15 billion annually for research and development activities, the article states:

"The resulting knowledge constitutes a major and expanding national resource. Its effective use can broaden and strengthen the Nation's technological base, increase the rate of economic growth, improve the quality of life, and help fill unmet human and community needs.

"To maximize the return on this public investment, the government has a clear responsibility to make the results of federally supported R&D available for the widest possible use. . . ."

Among other spinoff benefits of government research for the civilian population listed is the work of NASA's Marshall Space Flight Center in inventing an electromagnetic hammer that shapes and smooths metal without weakening it. The tool is now used in shipbuilding, automobile, and aircraft factories.

Currently being used to clarify medical X-ray pictures is a computer technique developed to enhance TV pictures of the Moon and Mars sent back by Surveyor and Mariner spacecraft.

A new educational device enables a student to determine quickly the relative position of the planets on any day between the years 1900 and 2000. Sales indicate that the device, developed for spacecraft trajectory models, is in wide demand.

NASA's Langley Research Center conducted studies of landing accidents on wet runways that resulted in safer designs for airport runway surfaces and highways, saving many lives and millions of dollars.

More than 100 companies have shown interest in a new paint NASA researchers developed for spacecraft.

Finding use as a crippled children's chair is a 6-legged vehicle design proposed for unmanned exploration of the moon; it surmounts obstacles that would stop an ordinary wheelchair.

Similarly, device for astronauts to practice walking on the moon where gravity is a sixth that of the earth, is being adapted by a rehabilitation hospital to train crippled children to walk.

Finding experimental use in equipment with which electrocardiograms of ambulance patients can be flashed ahead to hospital receiving rooms is a plastic-metallic spray that was developed for attaching heart electrodes to NASA test pilots.

Possible application to making artificial hip joints for humans is anticipated for new metal alloys using a hexagonal crystal structure rather than a cubic crystal structure. Many other industrial uses are envisioned.

Col Daniels Takes Command of AEHA at Edgewood

Col Roswell G. Daniels has assumed command of the Army Environmental Hygiene Agency, Edgewood (Md.) Arsenal, following service as director of Medical Services. Prior to assignment to Edgewood, he served 23 months with HQ U.S. Army Europe, and with the Seventh Army. A one-year tour preceded his assignment to Europe at HQ 9th Hospital Center as chief, Preventive Medicine Division.

Assigned to the Office of the Surgeon for the Ryuku Command, Okinawa, as chief, Preventive Medicine Division (1955–58), he served in the Office of The Surgeon General, Washington, D.C., as chief, Occupational Health Branch, Preventive Medicine Division (1961–65).

He attended Hamilton College, Clinton, N.Y., received an MD degree from Rochester College of Medicine in 1947, and earned a doctorate in public health from the University of Pittsburgh's Graduate School of Public Health in 1960.

Col Daniels is a member of the American College of Preventive Medicine, American Public Health Association, Association of Military Surgeons, American Medical Association, Industrial Medical Association, American Association for Advancement of Science, American Conference of Governmental Industrial Hygienists, and the American Academy of Occupational Medicine.

Col Roswell G. Daniels

Wheeler

Palmer

Resor

Ailes

Chesarek

Top Army Commanders, Industrial Exhibits Featured At 15th Annual Association of U.S. Army Meeting

For Summary Of Highlights, Major Speeches See page 14

Major speakers at the 15th annual meeting of the Association of the United States Army, Oct. 13–15, in Washington, D.C., included General Earle G. Wheeler, Chairman of the Joint Chiefs of Staff; Secretary of the Army Stanley R. Resor; General F. J. Chesarek, CG of the U.S. Army Materiel Command; General Bruce Palmer, Army Vice Chief of Staff; and former Secretary of the Army Stephen Ailes, AUSA Council of Trustees. At left are Cyrus R. Vance, recipient of the George Catlett Marshall Medal, and General William C. Westmoreland, Army Chief of Staff. Exhibits (shown below) included OH–58A and CH–47C helicopters, the M109 155mm howitzer and hardened foam that holds a jeep above water.

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